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MARCH, 1946

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Technical Bulletin No. 19 on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

GR-S-10 (Rosin Soap Polymer) with 100 Parts of Zinc Oxide

"Monex" Acceleration

(Refer to Technical Bulletins No. 9, 10, 11, 13, 14, 16, and 18)

WITH "Monex" acceleration, 100 part Zinc Oxide—GR-S-10 compounds show satisfactory tensile properties and practically constant elongations over a 45 minute curing range. As with SPDX-G (Technical Bulletin No. 14), there is a definite indication of reversion. The permanent set is low and this is reflected in good heat generating properties, without adversely affecting cut-growth. The room temperature rebound is low, as is the case generally for GR-S-10 in comparison with GR-S.

COMPOUND No. 19

GR-S-10	100.0
Sulfur	2.0
"Monex"	0.5
Coumarone-indene Resin	3.0
E.L.C. Magnesia	5.0
Zinc Oxide	100.0

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of:				Permanent Set	Shore Hardness	Tear Resistance Tested at:	
			200%	300%	400%	500%			Room Temp.	100°C.
15	1930	810	215	285	430	605	.24	42	107	64
30	1630	675	260	370	520	780	.13	44	88	44
45	1580	640	265	415	565	865	.10	44	88	38
60	1520	640	265	380	535	840	.08	44	71	35
90	1520	650	220	335	480	740	.08	44	72	34

Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum		Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Room Temperature Inches Failure at
	Indentation in mm.	Per Cent Rebound	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression Initial	Dynamic Compression Final	15,000 Cyc.
90	8.04	51.4	27.4	15'-2.9	20.3	18.5	20.0	.34

* Test Conditions: 100 lb. Load. 0.15" Stroke. 100° C. Oven Temp.

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100°C.

64
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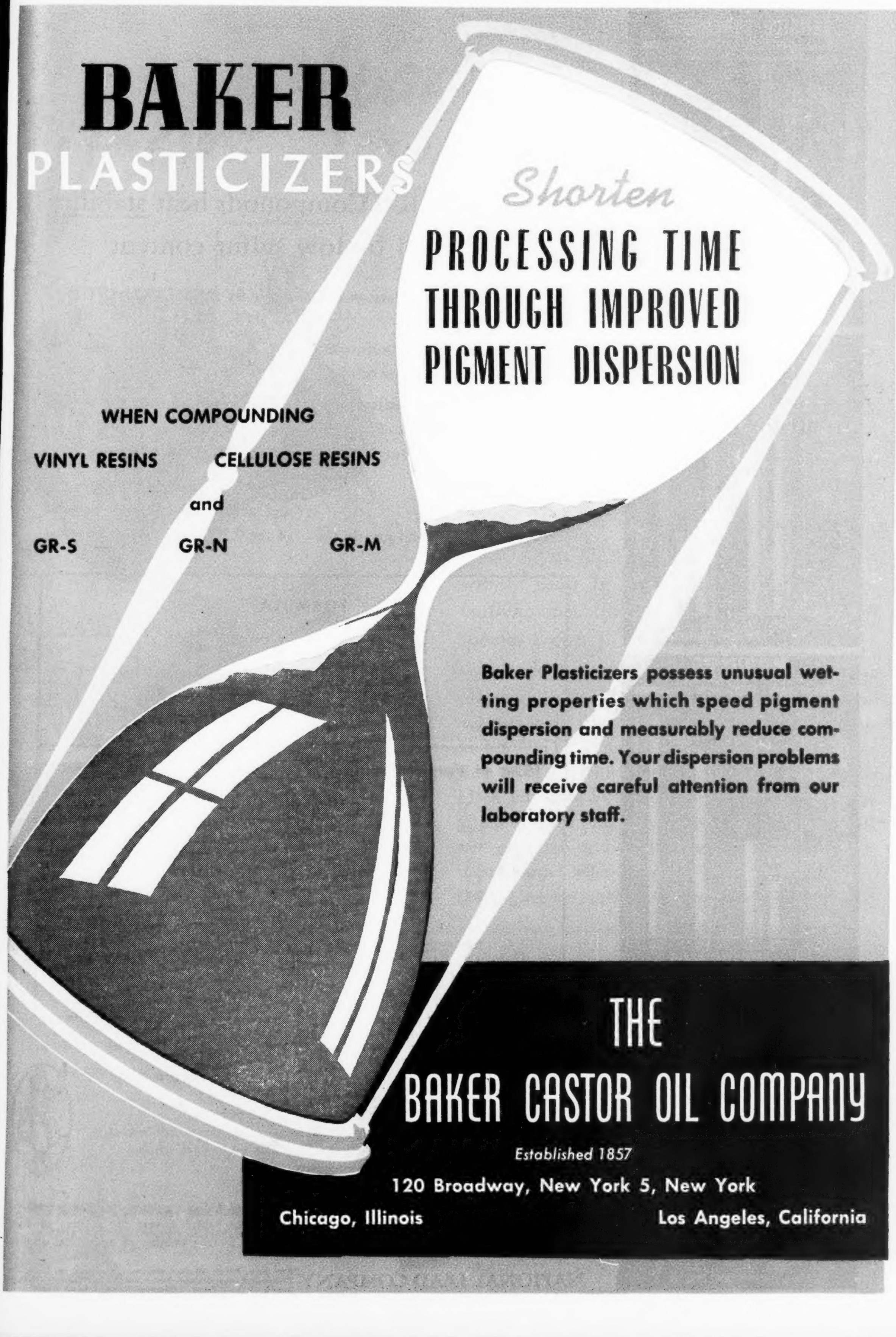
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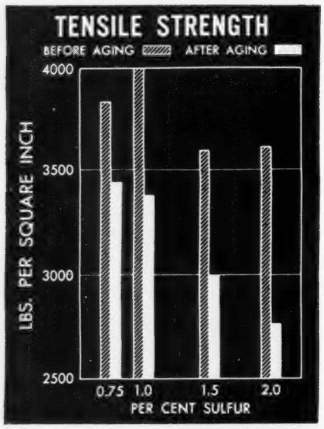

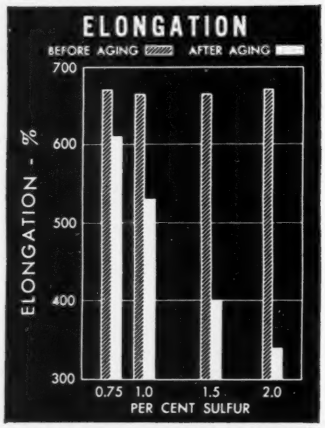

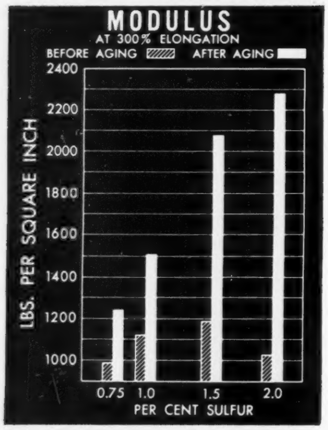

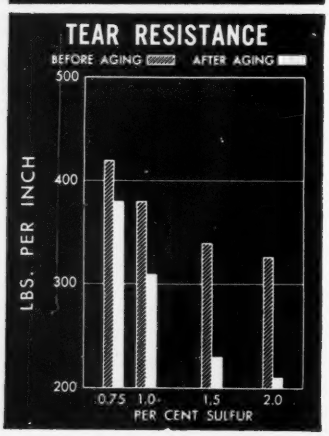

Give your GR-S Compounds heat stability provided by low sulfur content

Safe, fast curing now made possible by FBS LITHARGE

As you know, reduction in sulfur content means increase in heat stability.

It has now been demonstrated that FBS litharge (plus benzothiazyl disulfide) makes low sulfur formulas practicable.

Why?

Because it speeds up greatly the rate of cure without increasing the risk of scorching.

Thus, even though the normal quantity of accelerator is used, *the sulfur content can be reduced.*

Note, in the series of tests charted and tabulated, the superior behavior of the 0.75 and 1.0 sulfur formulas.

FORMULA

GR-S (Institute)	100
E.P.C. Carbon Black	50
Zinc Oxide	3
Coal tar softener	5
Benzothiazyl Disulfide	1.0
FBS Litharge	1.5
Sulfur	variable

Effect of Varying Amounts of Sulfur on Physical Properties

(Curing period: 20 min. Temp: 287° F.)

% Sulfur	*Tensile Strength*	*% Elongation*	*Modulus at 300% Elong.*	*Tear Resistance*
0.75	3840	670	980	420
1.0	4000	665	1120	380
1.5	3600	665	1190	340
2.0	3620	670	1025	325
After Aging 24 Hours at 100° C.				
0.75	3460	610	1240	380
1.0	3380	530	1510	310
1.5	3000	400	2080	230
2.0	2770	340	2280	210

CONCLUSIONS:

1. FBS Litharge-thiazole with low sulfur imparts heat stability.
2. Modulus is high and steady.
3. Elongation is retained despite exposure to heat.
4. Heat stability prevents brittleness and improves tear resistance.
5. Rate of cure is relatively fast, without tendency to scorch.
6. The combination is inexpensive and efficient.

Ask us to send you a printed report, "Compounding of GR-S for Heat Resistance," issued by the Rubber Division of our Research Laboratories, which covers the subject of FBS Litharge for low sulfur formulae in greater detail and from a number of additional angles.

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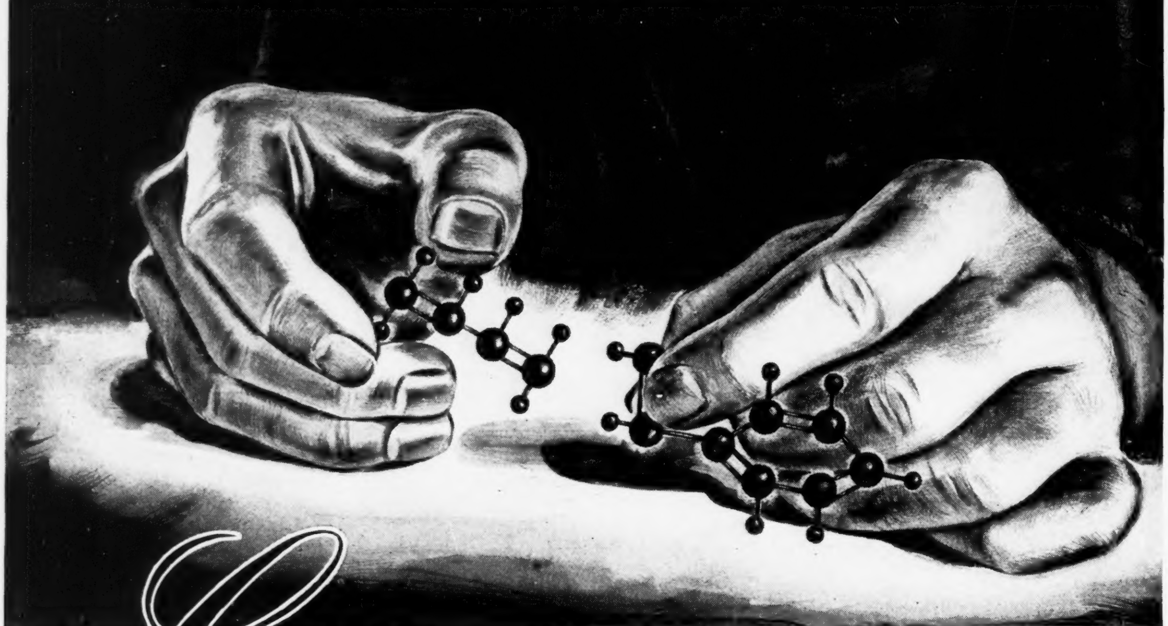

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What are their advantages and limitations?
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applications and equipment
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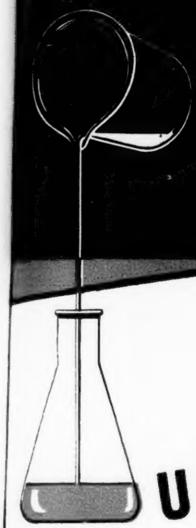
made under controlled temperature*



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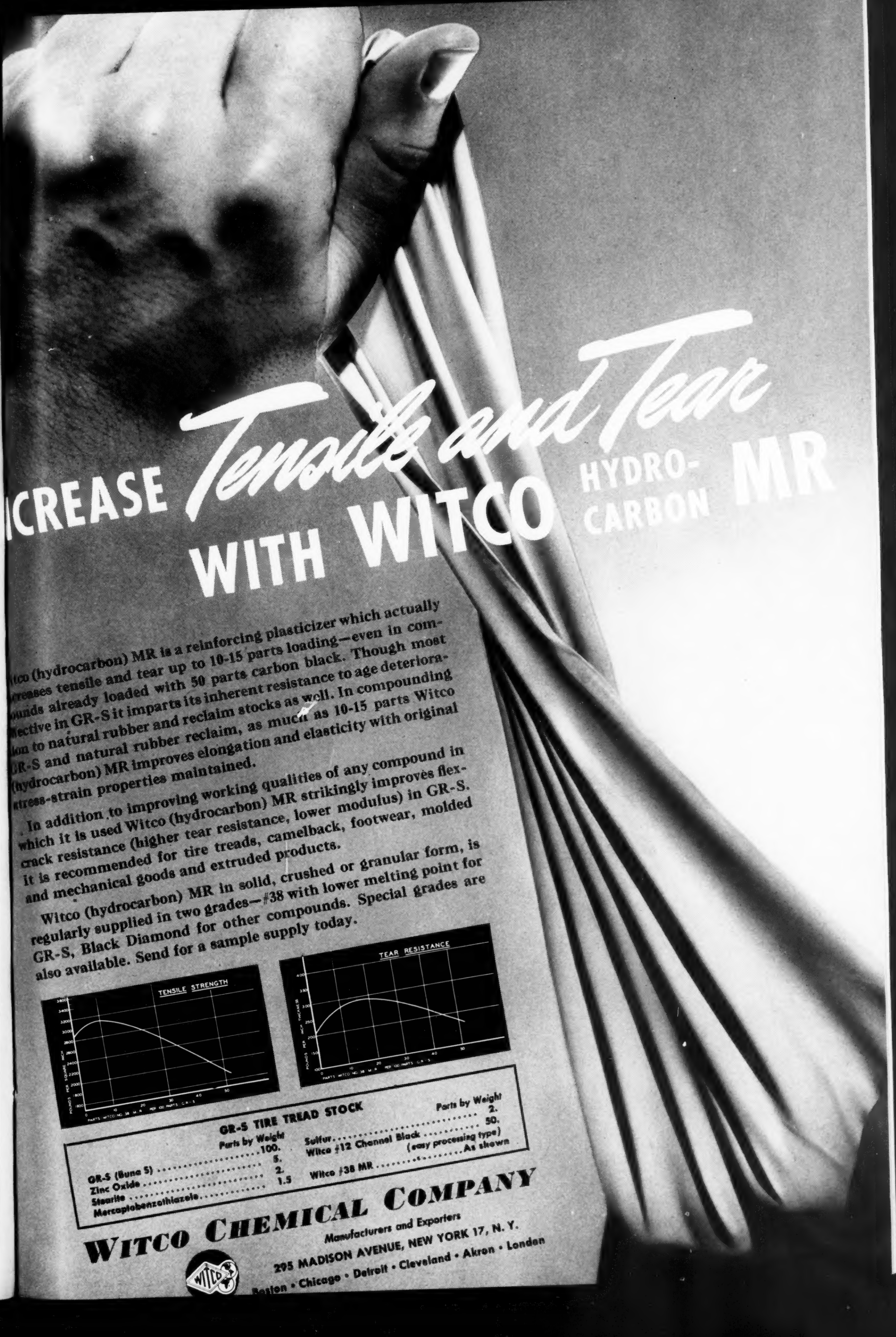
(MAGNESIUM OXIDE)



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TEAR RESISTANCE
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PARTS WITCO NO 38 M.R. PER 100 PARTS G-R-S
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Mercaptobenzothiazole 1.5
Sulfur 2.
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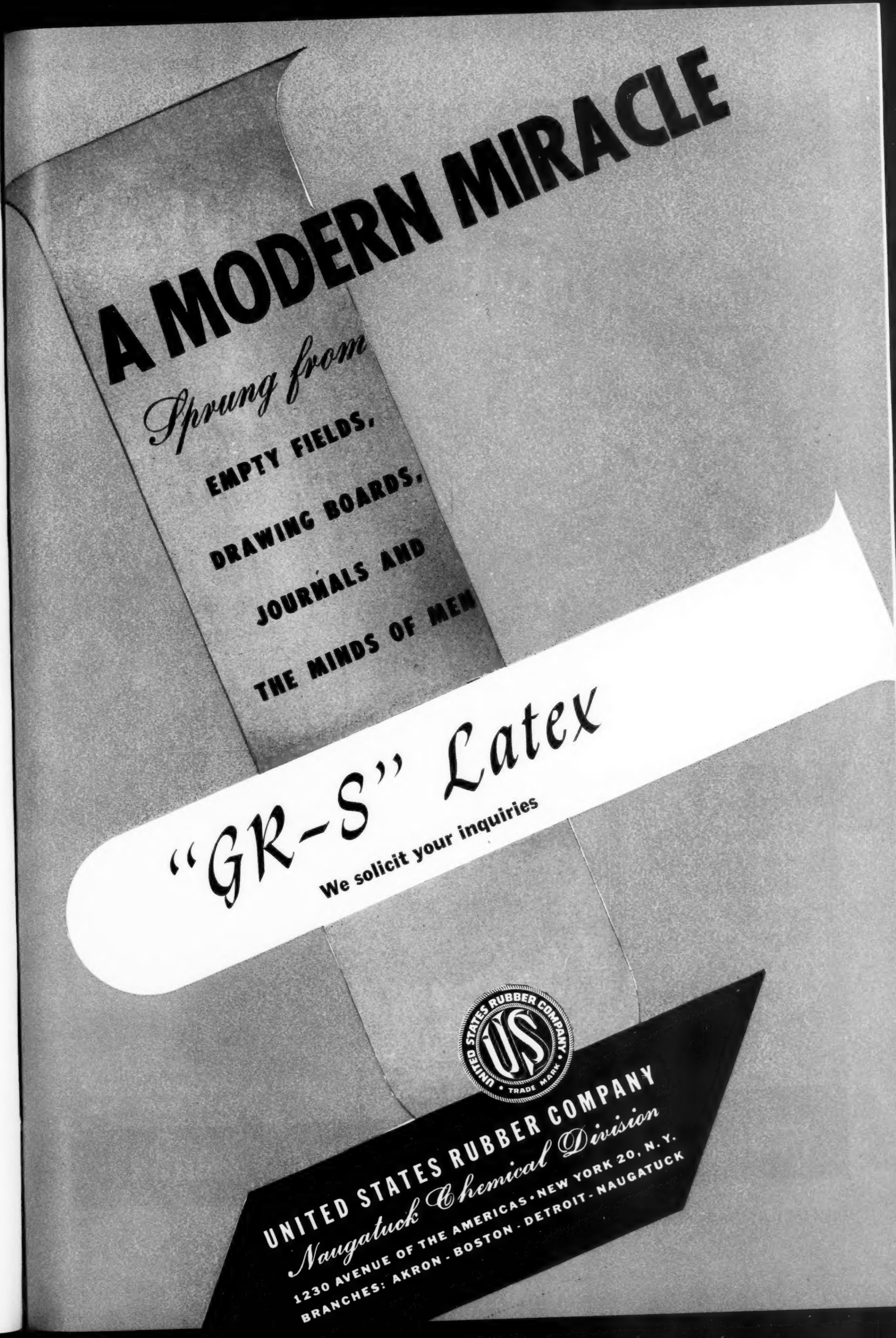

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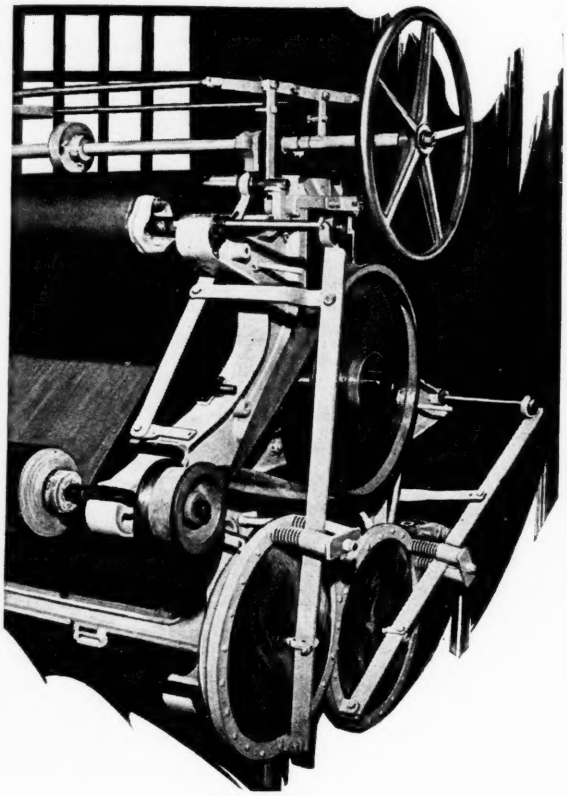

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March, 1946

Volume 113 Number 6

A Bill Brothers Publication

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

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INDIA
RUBBER WORLD
NATURAL & SYNTHETIC
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Volume 113 New York, March, 1946 Number 6

Plastics in the Rubber Industry[1]

H. A. Winkelmann[2]

THE rubber industry, early in 1942, was cut off from the major portion of its supply of natural rubber. Through the cooperation of the chemical, petroleum, and rubber industries a gigantic chemical industry was created in time to avert a national catastrophe. A range of synthetic elastic polymers was selected and produced to meet military, industrial and civilian requirements (Table 1). During the critical shortage the rubber industry investigated and tested various high molecular weight polymers belonging in the field of plastics (Table 2). It was found that many of the plastics could be compounded or modified to give rubber-like elastomers. These materials performed so well in their new and normal applications that the synthetic resin industry has more than tripled during the war.

TABLE 1. SYNTHETIC RUBBERS

Butadiene copolymers
- Butadiene and acrylonitrile
  - Hycar OR—15 and 25
  - Buna N or Perbunan
  - Butaprene NXM, NL, NF
  - Chemigum N-1, N-2
  - "Thiokol" RD
- Butadiene and styrene
  - GR-S (Buna S)
  - Chemigum S
  - Hycar OS-10
  - Butaprene SS

Chloroprene polymers
- Neoprene E, G, GN, M, I, GR-M

Chloroprene and isoprene
- Neoprene FR

Chloroprene and acrylonitrile
- Neoprene ILS

Butene polymers
- Isobutylene and butadiene or isoprene
  - Butyl (GR-I)

Organic polysulphides
- "Thiokol" A, FA
- "Thiokol" B, D
- "Thiokol" N
- "Thiokol" ST

Polyesters
- Paracon
- Paraplex X100, S200

Silicones
- Silastic

TABLE 2. PLASTICS

Thermosetting
- Phenol-formaldehyde
- Phenol-furfuraldehyde
- Urea-formaldehyde
- Melamine-formaldehyde
- Thiourea-formaldehyde
- Aniline-formaldehyde

Thermoplastic
- Ethyl cellulose
- Cellulose acetate
- Cellulose acetate butyrate
- Cellulose acetate propionate
- Cellulose nitrate
- Cellulose propionate
- Polystyrene
- Polydichlorostyrene
- Vinyl acetate
- Vinyl chloride
- Vinyl chloride acetate
- Polyvinyl alcohol
- Acrylates
- Allyl esters
- Vinylidene chloride
- Polyvinyl vinylidene chloride
- Polyamides
- Polyethylene
- Silicones
- Proteins
- Bitumen
- Miscellaneous hydrocarbon polymers
  - Marbon S, S-1
  - Styralloy 22
  - Stanco S-40, S-50, S-60, PS-60
  - Pliolite S, S-3
  - Piccolastics
- Alkyd resins
- Maleic resins
- Synthetic fibers
  1. Viscose
  2. Rayon
  3. Chardonnet silk
  4. Cupramonium silk
- Protein-like fibers
  1. Nylon
  2. Lanital
  3. Soya-bean fibers
- Vinyl resin fibers
  1. Vinyon
  2. Saran

Synthetic rubbers, plastics, and fibers can generally be distinguished on the basis of their physical and thermal properties. Differences in behavior may often be due to the magnitude of intermolecular forces between chains,

[1] Presented before the Society of Plastics Engineers, Detroit, Mich., Jan. 7, 1946.
[2] Dryden Rubber Co., Chicago, Ill.

rather than basic structural differences. A variation in the porportions of the raw materials used may give a rubber-like material in one instance and a semi-rigid or rigid plastic in another. The properties of the polymers are dependent upon time, temperature, pressure, type of catalyst, modifying agent, purity of monomer, and presence of other monomers. Copolymers are very complex, and the individual polymer chains may not all be alike.

The large number of materials now available (Tables 1, 2, and 3) clearly indicate the large amount of work that must be done properly to evaluate and correlate the properties and applications of these products. The rubber technologist is keenly aware of the increased scope of the rubber industry as a result of the adoption of these synthetic polymers in new as well as improvements in existing products.

The rubber industry has the necessary equipment to compound, mix, calender, extrude, and mold plastic materials. Recent improvements in extrusion and molding methods will facilitate the handling of a greater variety of materials in a shorter time.

TABLE 3. ELASTOMERS (RUBBER-LIKE)

- Terpene polymers
  - Advagum
  - Piccolyte
- Polybutene
  - Vistanex
  - Synthetic 100
- Vinyl polymers
  - Polyvinyl acetate
    - Vinylite A
  - Plasticized polyvinyl chloride
    - Flamenol
    - Geon
    - Koroseal
    - Vinylite Q
  - Plasticized vinyl chloride acetate
    - Vinylite V
  - Polyvinyl vinylidene chloride
    - Geon 200
    - Plioflex
  - Plasticized polyvinyl alcohol
    - PVA
    - Resistoflex
  - Polyvinyl acetals
    - Polyvinyl alcohol and formaldehyde
      - Formvar
    - Polyvinyl alcohol and butyraldehyde
      - Butacite
      - Butvar
      - Vinylite X
  - Polyvinylidene chloride
    - Saran

TABLE 4. CHARACTERISTICS OF SELECTED PLASTICS WHEN USED ALONE OR IN COMBINATION WITH RUBBER OR SYNTHETIC RUBBER

Sunlight resistance
Ozone resistance
Non-flammability
Oil and solvent resistance
Water resistance
Resistance to acids, alkalis, and salts
Electrical properties
Flexing
Organic reenforcing agents
Colored or transparent products
Non-toxic
Odorless
Resistance to diffusion of air, hydrogen, oxygen, nitrogen, etc.

Characteristics of Some Resin-Rubber Blends

During the rubber shortage the rubber and allied industries used rubber-like elastomers in making a large variety of products. The excellent service performed by polyvinyl chloride, polyvinyl chloride acetate, vinylidene chloride, polyvinyl vinylidene chloride, polyvinyl alcohol, polyvinyl butyral, styrene polymers, polyethylene, nylon, etc., during the emergency is such general knowledge that it is unnecessary to discuss in detail the properties of these materials or the numerous products fabricated from them. The service rendered by many of the products has been so outstanding that they will continue to be used in competition with natural and synthetic rubber. These elastomers each possess characteristics that are often impossible to duplicate with rubber or synthetic rubber alone. Table 4 gives some of the outstanding properties of synthetic resins when used alone or which they may impart to rubber and synthetic rubber.

Table 5 indicates the behavior of various plastic materials when exposed to different materials and conditions. In view of the differences in methods of preparation and handling of these plastics that are possible, this table is offered only as a guide in selection of a material to meet a specific requirement.

TABLE 5. BEHAVIOR OF PLASTIC MATERIALS

	No Effect	Very Slight or Slight Effect
Sunlight	Polyvinyl alcohol	Polyvinyl chloride Vinylidene chloride Polyvinyl butyral Methyl methacrylate Polyethylene Nylon powder
Weak acids	Polyvinyl chloride Vinylidene chloride Polystyrene Polyethylene Nylon powder	Polyvinyl butyral Methyl methacrylate
Strong acids	Polyvinyl chloride Vinylidene chloride Polyethylene	Polyvinyl butyral
Weak alkalis	Polyvinyl chloride Vinylidene chloride Polystyrene Polyethylene Nylon powder	Methyl methacrylate
Strong alkalis	Polyvinyl chloride Vinylidene chloride Polystyrene Polyethylene Nylon powder	Methyl methacrylate
Ketones and esters	Vinylidene chloride Polyvinyl alcohol Polyethylene Nylon powder	
Aliphatic hydrocarbons and oil	Polyvinyl alcohol Vinylidene chloride Polyvinyl butyral Polyvinyl chloride Polyethylene Nylon powder	
Aromatic Hydrocarbons	Polyvinyl alcohol Vinylidene chloride Polyethylene Nylon powder	

Uncured rubber or synthetic rubber has but few applications, and the good properties which are associated with rubber such as tensile strength, elasticity, recovery, resistance to cold and heat, resistance to tear and abrasion, are brought about by vulcanization. Rubber-like elastomers are thermoplastic and are affected by high and low temperature. Plasticizers improve low temperature flexibility, although the product may suffer from leaching out or volatilization of the plasticizer when subjected to oils or heat. Vulcanization studies will broaden the scope of plastic materials and will still further narrow the gap between rubber and plastics.

There are a number of hydrocarbon polymers, some of which are styrene types of polymers, which improve the processing and extrusion of synthetic rubber and act as organic reenforcing agents. In general they improve the tensile strength, hardness, toughness, resistance to tear and abrasion although it is impossible to generalize because of the many products that are possible in this class of materials. Examples of some of these—type polymers are:

Marbon S, S-1
Marmix
Pliolite S, S-3
Stanco-S-40, S-50, S-60, PS-60
Piccolastics
Dow 276V-2, V-9.

TABLE 6. GR-S TYPE 3 LATEX—MARMIX 4950

	1	2	3
GR-S (from type 3 Latex)	100	91	80
Marmix 4950 (from dispersion)	..	9	20
AgeRite white	1	1	1
Zinc oxide	3	3	3
Sulphur	2	2	2
Methyl zimate	2	2	2

Oven cure—212° F.

Time Min.	1: Mod. 300%	1: Tens. P.S.I.	1: % Elong.	1: Hard.	2: Mod. 300%	2: Tens. P.S.I.	2: % Elong.	2: Hard.	3: Mod. 300%	3: Tens. P.S.I.	3: % Elong.	3: Hard.
20	95	1050	980	44	135	1620	960	51	235	1350	845	65
40	90	985	725	47	160	2105	800	51	315	1700	680	68
60	135	1110	665	48	205	2300	750	55	425	1515	530	72
Aged 36 Hours at 212° F.												
20	220	895	500	45	365	1855	495	52	895	2015	445	68
40	220	905	455	48	390	1765	490	56	1170	2275	425	71
60	245	890	455	48	525	1230	445	56	1100	1665	375	73

Marbon S and S-1 synthetic hydrocarbon resins act as heat plasticizers and organic fillers in synthetic rubbers. Their use results in an increase in modulus, tensile strength, hardness, stiffness, and resistance to tear and abrasion. They reduce shrinkage and produce smooth tubing of compounds containing little or none of the conventional fillers. The excellent electrical characteristics and low water absorption of these resins have resulted in many applications in the insulation field for signal and telephone wire, submarine and ignition cable.

Marbon is available in an aqueous dispersion of about 32% concentration (Marmix).[3] Marmix is handled and compounded in the same manner as rubber or synthetic rubber latex. The reenforcing action of Marmix on GR-S-3 latex is shown in the following compounds (Table 6). The dispersions were cast on glass plates, air dried, and subsequently cured in a hot air oven at 212° F. at the times indicated. Marmix increases the tensile strength, stiffness, and toughness of GR-S. GR-S-Marmix latex coated on wire gives a film that holds its shape during processing and is stronger and tougher than when only GR-S is used.

PS-60 resin is an excellent plasticizer and processing aid for Butyl rubber. It is possible to obtain a smooth sheet of pure gum butyl rubber by the addition of 20 parts PS-60 per 100 of butyl rubber. PS-60 improves processing and reduces shrinkage of GR-S.

Polymers of styrene and its homologs (Piccolastics) varying in molecular weight from 300 to 50,000 are being used to improve processing and increase the softness and tackiness of GR-S. They are being used in cements, pressure-sensitive tape, and sponge rubber. As an organic filler in soles they increase hardness, stiffness, and boardiness. The physical properties are improved because it is possible to obtain hard compounds without using a high loading of ordinary fillers.

Pliolite S-3 is being used with GR-S to give tough wear-resistant soling compounds.

Styraloy 22, a pure hydrocarbon of low specific gravity, has been compounded with natural rubber, GR-S, buna N, neoprene, polyisobutylene, polystyrene, and polyvinylidene chloride to give a variety of products. It improves low temperature flexibility, water resistance, and electrical properties of the synthetic rubber.

A saturated polyester (G-25) which is non-volatile and oil and water resistant has been used to plasticize polyvinyl resins and buna N-type synthetic rubbers. It imparts low flammability, good plasticity, and heat resistance.

Polyethylene is a processing aid and at the same time improves the toughness of GR-S. In Germany, polyethylene, molecular weight 3,000, was mixed with vistanex to improve tensile strength and reduce the cold flow. This blend can be readily milled and calendered. Polyethylene of a molecular weight of 15,000 was used in wire insulation.

Polyvinyl butyral effectively reduces the shrinkage of GR-S. Ten parts of polyvinyl butyral added to 100 parts of GR-S on a hot mill (in 10 minutes) gives a larger sheet than the control on removal from the mill. After three hours' rest and remilling on a cold mill for three minutes, the batch containing polyvinyl butyral gave a sheet with about 50% greater area than the control.

TABLE 7. POLYVINYL BUTYRAL IN GR-S

	A	B	C
GR-S	100	100	100
RPA No. 5	3	..	..
Polyvinyl butyral	..	5	10
MPC Black	50	50	50
Zinc oxide	5	5	5
Sulphur	2	2	2
Altax	1.5	1.5	1.5
DPG	.25	.25	.25
$639\frac{1}{2}$ oil	10	10	10
	171.75	173.75	178.75

ASTM Test Slabs—Original Tests

Compound	Cure—Min. @ 316° F.	Mod. 300%	Tensile P.S.I.	% Elong.	Hard.	Tear Lbs.
A	10	448	1480	740	55	248
	15	725	2320	655	58	345
	30	1095	2555	540	61	440
	45	1180	2695	530	62	285
B	10	1135	2880	600	65	500
	15	1190	2835	565	67	470
	30	1615	2885	455	68	385
	45	1810	2795	415	70	320
C	10	1470	2635	490	67	365
	15	1685	2665	455	68	395
	30	2020	2750	390	70	295
	45	2170	2690	360	71	297
Oxygen Bomb, Two Days at 80° C., 50 Lbs.						
A	10	1155	2415	615	54	520
	15	1370	2600	550	70	525
	30	1535	2740	470	70	375
	45	1555	2770	495	70	340
B	10	2185	2670	360	75	330
	15	2180	2340	325	75	340
	30	2280	2400	315	77	262
	45	2540	2790	320	77	282
C	10	2265	2585	330	76	335
	15	2420	2500	310	77	305
	30	....	2445	275	78	305
	45	....	2405	270	79	265
Oven Aging 70 Hours at 100° C.						
A	10	2020	2170	325	71	300
	15	....	2160	265	71	225
	30	....	2310	295	71	240
	45	2050	2445	345	70	270
B	10	....	2380	205	76	178
	15	....	2230	215	76	225
	30	....	2360	255	76	201
	45	....	2360	260	76	254
C	10	....	2185	200	78	207
	15	....	2160	210	80	173
	30	....	2425	240	80	182
	45	....	2180	235	78	207

Blends of Butadiene-Acrylonitrile Copolymers and Polyvinyl Chloride

The ozone resistance of butadiene-acrylonitrile copolymers is improved by incorporating 10 to 50% by weight of polyvinyl chloride.[4] The mixture is used as an electrical insulator. Henderson[5] describes a composition of matter, vulcanized or unvulcanized, consisting of polyvinyl chloride and butadiene-acrylonitrile.

[3] Marbon Corp. (1945).
[4] Badum, U. S. patent No. 2,297,194 (1942).
[5] U. S. patent No. 2,330,353 (1943).

TABLE 8. POLYVINYL CHLORIDE AND BUNA-N BLENDS

A Butadiene-Acrylonitrile Compound		B Polyvinyl Chloride Compound	
Butadiene-acrylonitrile polymer	100	Polyvinyl chloride	100
Channel black	65	Tricresyl phosphate	95
Dibutyl phthalate	25	Lead silicate	2
ZnO	5		197
Phenyl-beta-naphthylamine	1		
Cottonseed fatty acids	1.5		
Dimethyl mercaptothiazole	1.5		
Sulphur	1.5		
	200.5		

Eighty parts of A is mixed with 20 parts of B and vulcanized 30 minutes at 300° F. This compound swells only 1.8% by volume after 14 days' immersion in gasoline. This compares with a swelling of 12.6% by the copolymer vulcanizate and a shrinkage of 16% by the polyvinyl chloride compound.

Hycar OR-15 and OR-25 are compatible in all proportions with stabilized polyvinyl chloride. The blends process similar to Hycar compounds as far as extruding, calendering, and molding except that higher temperatures are required.

The advantages of Hycar-polyvinyl chloride blends are as follows:[6]

(1) Good processing qualities
(2) Excellent finish and appearance
(3) Good resistance to sunlight
(4) Impervious to solvents, oils, and gases
(5) Reduce flammability of hycar
(6) Improved resilience
(7) Plasticizers suitable for either polyvinyl chloride or Hycar OR are generally satisfactory for both materials
(8) Compression set characteristics of polyvinyl chloride are improved.

The selection of a plasticizer for blends of butadiene-acrylonitrile copolymer and polyvinyl chloride, polyvinyl vinylidene chloride and polyvinyl chloride acetate is reflected in the physical properties of the compound. Low-temperature flexibility can be obtained with existing plasticizers. For heat service and fluid aging at high temperatures the selection of a plasticizer presents some problems owing to volatilization and extraction of the plasticizer. Further studies of plasticizers will probably develop materials that will overcome these difficulties.

Chemical or mechanical cross-linkages can produce some, but not all of the changes in physical properties which occur during vulcanization.[7] Mixed polymers are formed by copolymerization of compounds containing one polymerizable group with compounds containing two polymerizable groups. These copolymers are vulcanized. Vulcanizable plasticizers are liquids containing two polymerizable groups which may be used as plasticizers for thermoplastic resins. Polyvinyl acetate may be milled with about one-third to one-half of its weight of diallyl succinate and a small amount of benzoyl peroxide. When this composition is cured at 250° F., the product is no longer soluble in acetone. Vulcanization has been brought about by mechanical entanglement of the polyvinyl acetate.

Dinsmore[8] has shown that vulcanization of polyvinyl vinylidiene chloride (85:15) increases tensile strength and elongation of the plastic. This material is vulcanizable through loss of hydrogen chloride or chlorine.

The water resistance of polyvinyl alcohol may be improved by treatment with chromium salts or thermosetting resins such as dimethylol urea.[9]

Vulcanizable Polyvinyl Butyral

Polyvinyl butyral, when compounded with thermosetting resins and vulcanized, gives a product with reduced solubility and thermoplasticity. These compositions have been used as a replacement for rubber in waterproof fabrics, raincoats, ponchos, and hospital sheeting and gas protective coating, and fuel and oil line tubing of polyvinyl butyral has been used as a replacement for copper tubing. Solvent resistance is close to polyvinyl alcohol, and the water and weathering resistance is excellent. Processing, curing, and handling techniques are such that polyvinyl butyral may be handled on the same equipment used for rubber and synthetic rubber compounds. It is superior to most synthetic rubber compounds in its ability to flow and knit under heat and pressure. Table 9 shows that it cures rapidly and maintains its physical properties over a long range of cures. All cures show good physical properties after oxygen bomb and oven aging. The resistance to tear before and after aging is very good. Changes in formulation may be made to give softer as well as colored compounds.

TABLE 9. VULCANIZED POLYVINYL BUTYRAL (MONSANTO DB-157)

Specific Gravity 1.38

Cure—Min. @ 350° F.	Tensile P.S.I.	% Elongation	Shore Hardness	Lbs. Tear Per Inch
Original Tests—ASTM Test Slabs				
5	1765	250	70	305
10	1715	240	70	284
15	1710	215	72	292
20	1685	215	72	[illegible]
25	1700	215	73	241
50	1790	230	73	250
Two Days Oxygen Bomb 80° C. 50 Lbs. Pressure				
5	1610	310	62	305
10	1680	270	58	325
15	1670	260	62	315
20	1765	240	65	315
25	1730	245	65	310
50	1730	230	65	330
70 Hours in Oven at 100° C.				
5	1990	250	74	370
10	1910	210	75	340
15	2035	220	75	380
20	2100	150	78	410
25	2020	165	78	355
50	1985	165	79	325

% Compression Set, 30% Deflection 22 Hr. at 158° F.
ASTM Modified Method B
39.8%

Thermosetting Phenolic Resins in Synthetic Rubber

Thermosetting phenolic resins (such as Durez 12687) are effective in Buna N types of synthetic rubber for plasticizing the uncured stock and reenforcing the vulcanized compound. The phenolic resins are an aid in building up hardness and toughness without sacrifice in tensile strength and resistance to tear which generally occurs when high hardness is obtained by pigment loading. Soles and heels containing this type of resin give good resistance to tear and abrasion.

Table 10 shows that Durez 12687 increases the modulus, tensile strength, hardness, and resistance to tear and decreases the elongation when sulphur and accelerator are also present.

TABLE 10

	1	2	3
Hycar OR-25	100	100	100
ZnO	5	5	5
Stearic acid	1.5	1.5	1.5
Sulphur	1.5	1.5	1.5
Altax	1.5	1.5	1.5
Durez 12687	..	20	50
	109.5	129.5	159.5

Compound	Cure—Min. @ 316° F.	Mod. 200%	Tens. P.S.I.	% Elong.	Shore Hard.	Lbs. Tear
1	15	143	375	500	36	68
	30	151	350	420	36	64
	45	188	300	380	37	78
2	15	775	940	220	62	194
	30	820	950	210	62	139
	45	785	975	235	62	142
3	15	2490	2855	250	95	460
	30	2680	2940	240	95	410
	45	....	2845	185	95	400

Durez 12687, 20 parts, and MPC black, 50 parts, show a marked reenforcing action on Hycar OR-25 without any sulphur or accelerator present, (compound 6, Table 11). Fifty parts of Durez 12687 shows a marked reenforcing ac-

[6] "Blue Book," Hycar Chemical Co. (1944).
[7] Garvey, Alexander, Kung, and Henderson, **Ind. Eng. Chem.**, 33, 1060 (1941).
[8] **Chem. Eng. News**, 21, 1798 (1943).
[9] E. I. du Pont de Nemours & Co., Inc., U. S. patent No. 2,179,250 (1939).

tion on Hycar; whereas 20 parts does not (compare compounds 5 and 7, Table 11).

TABLE 11. DUREZ 12687 IN HYCAR OR-25

	4	5	6	7
Hycar OR-25	100	100	100	100
Durez 12687	..	20	20	50
MPC black	..	..	50	..
	100	120	170	150

Compound	Cure—Min. @ 316° F.	Mod. 200%	Tens. P.S.I.	% Elong.	Hard.	Lbs. Tear
4	75	96	192	460	31	46
	105	97	199	450	32	43
5	45	312	770	580	52	169
	75	390	785	410	57	126
	105	410	740	400	57	120
6	45	1380	1870	370	80	282
	75	1619	2785	360	86	340
	165	1790	2755	345	86	300
7	45	1640	1935	305	91	375
	75	1895	2210	290	93	440
	105	2110	2280	270	95	465

Butaprene NXM and Perbunan (Table 12) give hard compounds with good physical properties with Durez 12687 in the presence of sulphur and accelerator. Butaprene NF does not give so good results with Durez 12687 as Butaprene NXM.

TABLE 12. DUREZ 12687 IN BUTAPRENE AND PERBUNAN

	8	9	10
Butaprene NXM	100	..	..
Butaprene NF	..	100	..
Perbunan	..	..	100
ZnO	5	5	5
Stearic acid	1.5	1.5	1.5
Altax	1.5	1.5	1.5
Sulphur	1.5	1.5	1.5
Durez 12687	50	50	50
	159.5	159.5	159.5
Sp. gr.	1.10	..	1.07

Compound	Cure—Min. @ 316° F.	Mod. 200%	Tens. P.S.I.	% Elong.	Hard.	Lbs. Tear
8	15	2420	2815	375	95	530
	30	2815	3095	340	96	460
	45	2965	3195	310	96	465
9	15	....	795	130	80	183
	30	....	830	130	80	210
	45	....	815	140	80	165
10	15	..	2230	180	95	405
	30	....	2265	150	95	430
	45	....	2670	170	95	405

Without sulphur and accelerator, Durez 12687 alone or with MPC black does not show satisfactory reenforcement of GR-S (Table 13). When sulphur and accelerator are present in GR-S, Durez 12687 alone does not reenforce GR-S, but with MPC black good physical properties are obtained in a high hardness compound (compare compound 18 with compounds 15, 16, and 17, Table 14). This compound (18) still shows good physical properties after oven aging for 70 hours at 158° F.

TABLE 13. DUREZ 12687 IN GR-S

	11	12	13	14
GR-S	100	100	100	100
Durez 12687	..	20	20	..
MPC Black	..	..	50	50
	100	120	170	150

Compound	Cure—Min. @ 316° F.	Mod. 200%	Tens. P.S.I.	% Elong.	Shore Hard.	Lbs. Tear
11	75	....	24	1100+	11	8½
12	75	....	12	180	20	5½
13	45	....	365	55	85	115
	75	....	368	70	85	76
	105	....	375	45	85	95
14	45	92	195	470	40	41
	75	111	178	400	40	51
	105	115	205	400	40	48

S. van der Meer[10] has shown that phenol-formaldehyde resins react chemically with rubber to give satisfactory vulcanizates. The vulcanizing and hardening reaction of the phenol-formaldehyde resin should take place simultaneously. It is therefore desirable to start with a phenol, such as p-cresol, which has but two reaction-favorable positions. The mechanism of vulcanization by the phenol-formaldehyde resins is explained by the formation of bridge linkages between the rubber molecules. Vulcanization by phenol dialcohols, such as 2,6 dihydroxy ethyl-4-methyl phenol, is based on the conversion of these compounds into methylene quinones by elimination of water (Table 15).

o-Methylene quinones are more easily formed than the para isomers and also vulcanize rubber at a lower temperature. Phenol dialcohols or their derivatives do not show vulcanizing properties unless methylene quinones can be formed.

Vulcanization of rubber by phenol-formaldehyde derivatives is prevented by hexamethylenetetramine because the liberated ammonia combines with the methylene quinones as quickly as these are formed and before they can combine with the slow reacting rubber molecules. There is no vulcanization because cross-linkage between rubber molecules cannot take place. Vulcanization is based on the formation of primary valence bonds between rubber and phenol formaldehyde resin.

TABLE 14 DUREZ 12687 IN GR-S

	15	16	17	18
GR-S	100	100	100	100
ZnO	5	5	5	5
Stearic acid	1	1	1	1
Sulphur	2	2	2	2
Altax	1.5	1.5	1.5	1.5
DPG	.25	.25	.25	.25
MPC black	..	..	..	50
Durez 12687	..	20	50	20
	109.75	129.75	159.75	179.75

Compound	Cure—Min. @ 316° F.	Mod. 200%	Tens. P.S.I.	% Elong.	Shore Hard.	Lbs. Tear
15	15	180	240	255	32	36
	30	149	231	315	32	36
	45	131	197	255	32	32
16	15	161	204	295	50	55
	30	159	184	300	50	71
	45	162	192	300	50	63
17	15	....	138	200	65	55
	30	....	147	145	65	67
	45	....	161	90	65	67
18	15	1865	1970	220	93	298
	30	1940	2070	210	94	303
	45	2000	2200	225	95	300
Oven Aged 70 Hours at 158° F.						
18	15	....	2125	185	93	250
	30	....	2210	185	93	283
	45	....	2180	170	93	298

Uses of Synthetic Fibers and Miscellaneous Resins and Rubbers

Synthetic fibers such as nylon, rayon, vinyon, and glass have greatly increased the durability and service life of rubber products. By proper selection of fiber, synthetic rubber, or resin it is now possible to fabricate products with greater flex life, resistance to heat, oils, and chemicals than ever before.

Nylon tire cord has given extra strength to the airplane tire without increasing the bulk or weight. Nylon's mildew resistance led to its use in jungle, combat, and service boots. Resin-coated nylon cloth has been used in ponchos, sleeping bags, tents, etc.

A most important development in tire manufacture is the use of rayon cord in tires. 72,000,000 pounds of high-tenacity rayon were consumed in tires in 1944. Its use has been essential in heavy-duty truck tires because a thinner, less bulky tire generates less heat, thus giving longer tire life. Amino phenol-formaldehyde resins may be used as a sizing for rayon tire cord and to improve adhesion to rubber and synthetic rubber.

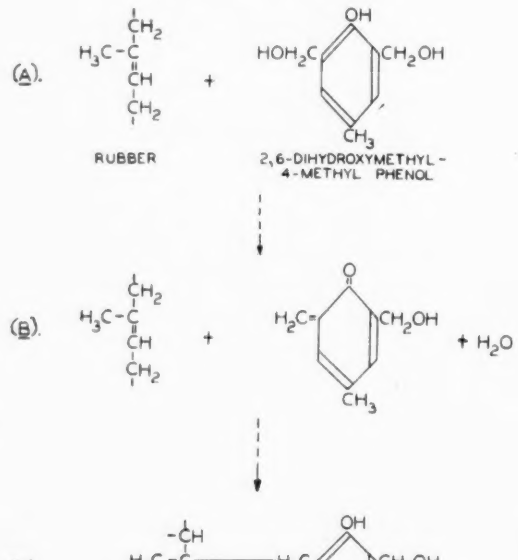
Vinyl resin fiber is spun, from a solution of vinyl chloride-acetate which contains about 90% vinyl chloride. The wet strength of the yarn is just as high as when it is dry. At room temperature it is resistant to concentrated hydrochloric acid, nitric and sulphuric acid, 30% sodium hydroxide, 28% ammonium hydroxide and salt solutions. It does not mildew, support combustion, or conduct electricity. It has found use in elastic bandages, tapes, webbing, women's foundation garments and underwear, chemically resistant workmen's clothing, raincoats, flameproof fabrics, packing, etc.

Chlorinated rubber cements for adhesion of rubber to

[10] Rec. Trav. Chim. de Pays Bas, 63, 4, 147 (1944).

metal have been replaced by synthetic resins during the rubber shortage. Bakelite BV-1112 and Durez 12987 give good adhesion of rubber to metal during vulcanization. The Bakelite BV-1112 coating on metal should preferably be baked in an air oven for 20 minutes at 212° F. before applying the rubber and curing.

TABLE 15. RUBBER—PHENOL-FORMALDEHYDE VULCANIZATION



Chlorinated polyisoprene promises to be a replacement for chlorinated rubber in many applications.

Adhesives containing synthetic rubber, plastics, or resins have been developed for adhering various materials to each other or to other surfaces. Resorcin-formaldehyde, furane resin, Pliobond, vinyl acetate, and polyisobutylene adhesives are but a few which have made a permanent place for themselves in this field.

Rubber as a lining material for tanks, pipes, valves, and other equipment has been of invaluable assistance in facilitating the transportation and handling of acids, alkalis, and corrosive chemicals. The development of satisfactory methods of adhering rubber to metal greatly increased the range of rubber lined equipment in the chemical industry. Both soft and hard rubber linings have been standard equipment for many years. The composition of the lining must be selected for its specific use. Today the types of materials used for lining purposes may include:

Plasticized polyvinyl chloride lining is more resistant to oxidation than natural rubber, and although it is thermoplastic, it is suitable for use at temperatures as high as 175° F.

GR-S tank and pipe linings have been used to handle mixtures of concentrated hydrochloric acid and chlorine. Tank cars lined with GR-S have been used in handling muriatic acid, phosphoric acid, and formaldehyde.

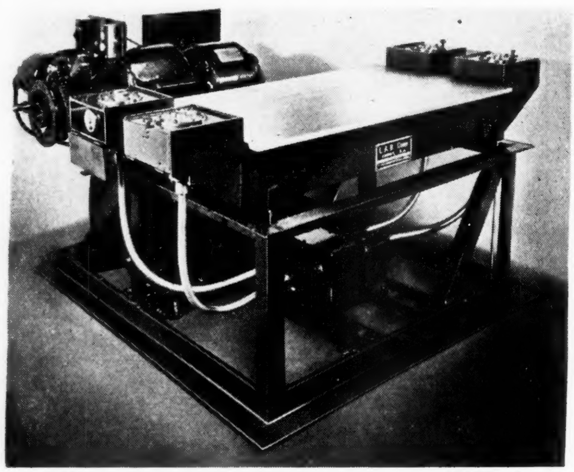
The petroleum industry has used tanks lined with Buna N to handle a mixture of hydrochloric acid and hydrocarbons.

Polystyrene will resist hydrofluoric acid.

Phenolic baking resins are used to line formaldehyde and beer storage tanks as well as other chemical process equipment.

Conclusions

The rubber technologist is faced with a tremendous job of studying and evaluating the many new materials available to him. It is safe to say that this is only the beginning and that further research and development will give us additional materials and more fundamental knowledge to enable us to use them to the best advantage.



L.A.B. "Shake Table" RV-3

Reaction-Type Vibration Test Table

A REACTION-TYPE vibration test table (L.A.B.-RV-3), used to shake out faults in assemblies and components, expedites correction of design and manufacturing errors, avoiding expense, embarrassment, and time-consuming field tests. Weaknesses can be predetected through vibration testing, and, when viewed with a stroboscope, relative vibratory displacements of parts can be observed.

The large table top is supported by four vertical rods acting as flexing columns to permit free table vibration in the two horizontal directions. Four sets of rotating eccentric weights induce rectilinear and pure harmonic vibrations. These weights, mounted on vertical shafts, are driven by a variable speed drive through a synchronizing gear box and flexible shafts. The amplitude (1/8-inch maximum excursion at 100 pounds' table load) and the direction of vibration (horizontal, crosswise, or lengthwise) are adjustable when the machine is not running. Increase in load over 100 pounds automatically reduces the amplitude.

The standard frequency range is 10-60 cycles a second, which is adjustable while running, either by hand wheel or ¼ h.p. motor-driven automatic frequency change control, with one minute complete cycle. Amplitude does not vary

(Continued on page 877)

Tensile Strength in Vulcanized Rubber

J. C. Williams[1]

VARIABLES which influence the tensile strengths of a given rubber have been discussed in the literature. This paper is concerned with the problem, "Why is one rubber stronger than another?"

TABLE 1. "A" VALUES AND CALCULATED *vs.* OBSERVED TENSILE STRENGTH VALUES FROM DATA OF MORRIS, MITTON, MONTERMOSO AND WERKENTHIN[3]

Elastomer	Number of Chain Carbons per Unit Weight of Elastomer ("A" Values)	Tensile Observed P.S.I. from Reference[3] Figure 6	Tensile from the Curve
Natural rubber	5.9	4000	
Buna S			
75-butadiene	3.26 1-2 addn.	2800	2200 1-2 addn.
25-styrene	6.03 1-4 addn.		4100 1-4 addn.
Buna-N			
75-butadiene	3.72 1-2 addn.	3200	2500 1-2 addn.
25-acrylonitrile	6.5 1-4 addn.		4400 1-4 addn.
Neoprene GN	4.57	3100	3100
Butyl (largely polyisobutylene)	3.57	2500	2400

The details of the formulation will be found in the reference cited. In regard to softener and pigment, the following proportions were used.

Elastomer	Pigment Channel Black	Softener
100 Natural rubber	50	3 pine tar-3 stearic acid
Buna S	60	5 Naftolen R-100
Buna N	50	10 Cumar P25, 15 dibutyl phthalate
Neoprene GN	35	4 stearic, 5 Barrett No. 10 Oil
Butyl	50	3 stearic

This topic is admittedly a rather difficult one, in that many variables enter into the actual tensile value as determined, and it is hard to isolate one for study. At first glance it appears that no theoretical comparison of the observed tensile values of the various vulcanized rubbers can be made. However the following points are considered encouraging since they indicate the progress that has been made in establishing the significance of certain factors which do affect tensile strength: (a) recipes have been studied and developed for years and now give tensile results that show the various rubbers at or near their best values; (b) vulcanization is ordinarily carried out to the optimum tensile for the given recipe; (c) the rubber mill tends to bring high molecular weights down (it would be unreasonable to compare the tensile obtainable from natural latex with that from a milled sample of rubber); (d) the vulcanized rubbers (here considered) are all non-polar materials and should behave somewhat similarly toward similar pigments.

Tensile Strength and Polymer Chain Length Relation

While imperfect data might easily prevent development of a formula relating tensile strengths in various rubbers, the chances are small for these to support it successfully. Accordingly the relations evolved below are presented as being of interest.

Following Mark,[2] it is considered that a material is rubber-like, first because the molecule has a low degree of symmetry, and, second, because the side groups are of low mutual attraction. It is proposed that the side groups make no contribution to tensile strength and, as far as this property is concerned, represent so much dead weight. In other words the tensile strength of the rubber is considered to depend on the proportion of the weight of the polymer which is in the main chain (or chain length of monomer per unit weight). This factor is determined as follows:

$$A = \frac{\text{Number of carbon atoms (monomer) which go into main chain}}{\text{Weight (Monomer)}} \qquad (1)$$

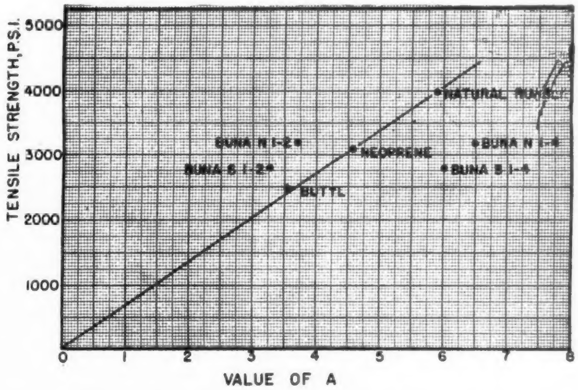


Fig. 1. Observed vs. Curve for Calculated Tensile Strength Values —Data of Morris, Mitton, Monermoso, and Werkenthin

Thus, for butadiene polymer,

$$A_b = \frac{4}{54} = 0.074;$$

and for styrene polymer,

$$A_s = \frac{2}{104} = 0.019.$$

For GR-S, which is 75 butadiene to 25 styrene,

$$\begin{aligned} 75 \times 0.074 &= 5.55, \\ 25 \times 0.019 &= 0.47; \\ A_{GR-S} &= 0.06. \end{aligned}$$

For convenience the A values are hereafter multiplied by 100. The hypothesis that A values have an important influence on tensile strength has been investigated as follows. For the first trial, a linear relation was assumed between the two. Since at zero A value, e. g., with no weight in the main chain, there would obviously be zero tensile, the assumption may be written.

$$\text{Tensile} = kA, \qquad (2)$$

In equation (2) k will have a constant value for a selected recipe containing a given pigment and fixed pigment-rubber ratio. This value (the slope of the curves) will change, obviously, in altering the recipe to go from a reenforcing to non-reenforcing pigment, or in changing the proportion of pigment to rubber.

[1] Mellon Institute of Industrial Research, Pittsburgh, Pa.
[2] Ind. Eng. Chem., 34, 1343 (1942).

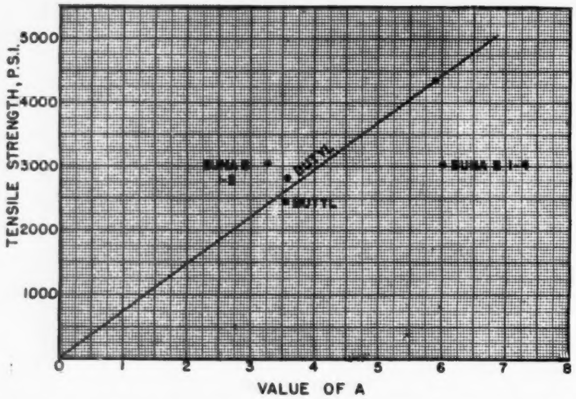


Fig. 2. Observed vs. Curve for Calculated Tensile Strength Values —Data of Sturgis and Trepagnier

TABLE 2. "A" VALUES AND OBSERVED TENSILE STRENGTH VALUES—DATA OF STURGIS AND TREPAGNIER[6]

Elastomer	A	Tensile Observed[*]
Natural rubber	5.9	4375
Buna S	3.26 (1-2)	3050
	6.03 (1-4)	
Butyl	3.57	2450
		(2825)

Formulation

Butyl	100		
Buna S		100	
Natural rubber			100
CF carbon black	50		
MPC carbon black	50	50	50
Zinc oxide	5	5	5
Stearic acid	3	2	3
Sulphur	2	2	3
Tetramethyl thiuram disulphide	1		
2-mercapto thiazoline		1.5	1

The higher tensile for Butyl was obtained by use of 0.75-part Polyac.

Comparison of Observed and Calculated Values

In comparing tensile strengths of a given compound made with various synthetics and natural rubber, it follows that if tensile is plotted against A values, a line drawn between the origin and the observed value selected as the standard, e.g., natural rubber gives a test of the various assumptions made by virtue of the fit of the other points to this line.

Data on the tensile strengths of various rubbers have been presented by Morris, Mitton, Montermoso, and Werkenthin.[3] These findings are summarized, along with calculated values of A, in Table 1. The graphical test is made in Figure 1, with the curve based on the observed tensile for natural rubber. The fit of the data is considered good in the cases of Butyl and neoprene.

Figure 1, however, illustrates a difficulty. The synthesis of Buna N or S may proceed by either 1-4 or 1-2 addition. If 1-4 addition were followed exclusively, the curve would predict strengths in excess of that for natural rubber. The tensile values falling short thereof indicate that considerable 1-2 addition has occurred, which is in accord with the fact that these rubbers are cross-linked.[4] The A values read from the curve in Figure 1 point to approximately 65% 1-2 and 35% 1-4 addition in the Buna rubbers. In view of the uncertainty introduced by the presence of cross-linking, this is not considered a significant figure.

Owing to their cross-linked or prevulcanized character, the butadiene copolymers do not flow and knit properly in the mold and do not develop significant strengths when compounded and vulcanized as gums. Milling in the presence of loading material seems to correct this behavior to a large extent (following milling such rubbers may readily be dissolved). However the success of the milling treatment (i.e., the extent to which cross-linking has been eliminated without serious degradation of the rubber molecule) in developing optimum tensile strength would influence the per cent. 1-2 or 1-4 addition found by this method. Hence the method cannot be considered exact.[5]

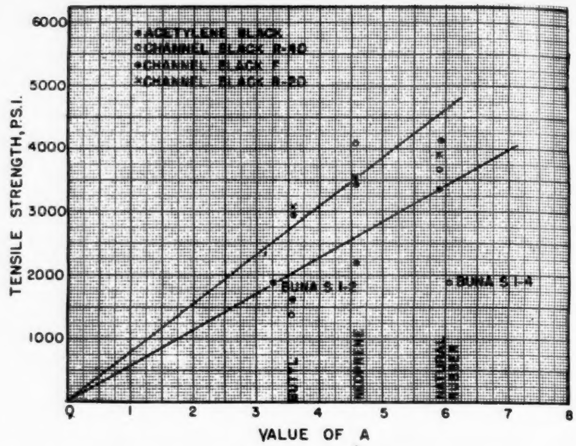


Fig. 3. Observed vs. Curve for Calculated Tensile Strength Values —Acetylene Black and Channel Blacks R-20, R-30, and R-40— Data of Cohan and Steinberg. (Each Curve Represents a Different Pigment and Pigment-Rubber Ratio)

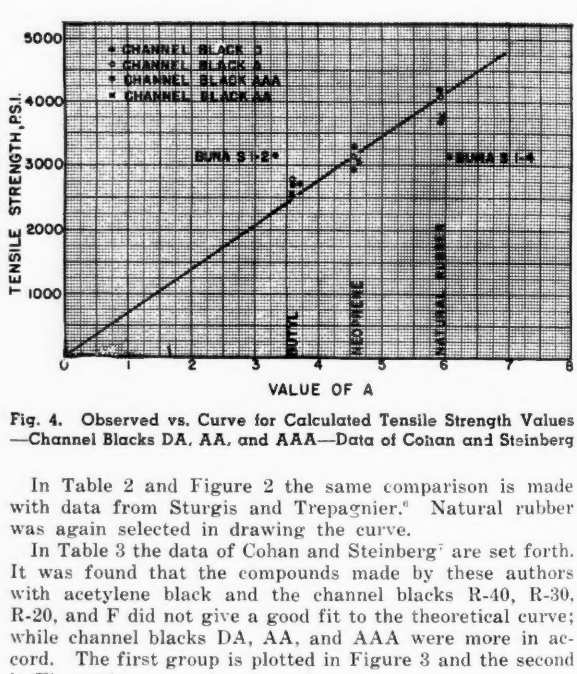


Fig. 4. Observed vs. Curve for Calculated Tensile Strength Values —Channel Blacks DA, AA, and AAA—Data of Cohan and Steinberg

In Table 2 and Figure 2 the same comparison is made with data from Sturgis and Trepagnier.[6] Natural rubber was again selected in drawing the curve.

In Table 3 the data of Cohan and Steinberg[7] are set forth. It was found that the compounds made by these authors with acetylene black and the channel blacks R-40, R-30, R-20, and F did not give a good fit to the theoretical curve; while channel blacks DA, AA, and AAA were more in accord. The first group is plotted in Figure 3 and the second in Figure 4.

In Table 4 the data are from Drogin, Grote, and Dillingham.[8] The corresponding curves are shown in Figures 5 and 6. It will be noted that here the pigment volume in the neoprene is different from in the other rubbers. Comparable loading is generally considered to be an equal volume of pigment per unit volume of rubber, which was not followed in this instance.

The subject of the different densities of the various rubbers deserves some attention. It is recognized that tensile strength figures are based on the strength of a square inch of rubber and do not take into account the density of the compound or of the rubber. This fact causes the great-

[3] **Ibid.**, 35, 647 (1943).
[4] Cheney and Kelley, **Ibid.**, 34, 1323 (1942).
[5] Tensile data reported on a dichlorostyrene-butadiene rubber **Chem. Eng. News**, 22, 1562 (1944) indicate that the 1-4 polymer has been prepared: observed tensile 4350 p.s.i., A value 5.41 calculated. Compare with top curve, our Figure 5.
[6] **Rubber Age** (N. Y.), 54, 325 (1944).
[7] **Ind. Eng. Chem.**, 36, 7 (1944).
[8] **Ibid.**, 36, 124 (1944).

TABLE 3. "A" VALUES AND OBSERVED TENSILE STRENGTH VALUES FROM THE DATA OF COHAN AND STEINBERG[7]

Elastomer	A		Acetylene	R-40	R-30	R-20	F	D	A	AA	AAA
			Tensile Observed with Various Carbon Pigments								
Natural rubber	5.9		3400	3700	4125	3950	4150	4200	4100	3800	3725
Buna S	3.26	(1-2)	1900	2800	2950	2900	3100	3150	3200	2900	2630
	6.03	(1-4)									
Neoprene GN	4.57		2200	4100	3875	3550	3475	3300	3175	3100	2950
Butyl	3.57		1630	1400	2475	3100	3000	2750	2800	2580	2750

Natural Rubber Stock		
Smoked sheet	-100	
Zinc oxide	7.85	
Pine tar	3.00	
Stearic acid	3.30	
Sulphur	2.81	
Mercaptobenzothiazole	0.743	
Carbon black	50.5	(25.6 vol.) / (100 vol. rubber)

Buna Stock		
Buna S	-100	
Zinc oxide	5	
Pine tar	5	
Stearic acid	2	
Sulphur	2	
Mercaptobenzothiazole	1.5	
Carbon black	50	(26.0 vol.) / (100 vol. Buna S)

Neoprene GN Stock		
Neoprene GN	100	
Zinc oxide	5	
Light calcined magnesia	4	
RPA No. 3	2	
Light process oil	1	
Stearic acid	1	
Phenyl-Beta-naphthylamine	2	
Benzothiazyl disulphide	0.75	
Carbon black	31	(25.6 vol.) / (100 vol. neoprene)

Butyl Stock		
Butyl	100	
Zinc oxide	5	
Stearic acid	1	
Sulphur	2	
Tetramethyl thiuram disulphide	1	
Mercaptobenzothiazole	0.5	
Carbon black	50	(25.8 vol.) / (100 vol. Butyl)

TABLE 4. "A" VALUES AND OBSERVED TENSILE STRENGTH VALUES FROM THE DATA OF DROGIN, GROTE, AND DILLINGHAM[8]

Elastomer	A		EPC Kosmobile 77	HMF Philback	HMF Kosmos 40	SRF Kosmos 20	MT Thermax
			Observed Tensile Strength with Various Carbon Pigments				
Natural rubber	5.9		4325	3620	3800	3500	3110
Buna S	3.26	(1-2)	2800	2600	2470	1985	600
	6.03	(1-4)					
Buna N	3.72	(1-2)	3340	....	3015	2825	1200
	6.5	(1-4)					
Neoprene Con.	4.57		3712	2985	3015	2800	2450
Butyl	3.57		3000	2050	2240	2040	2480

Formulations

Natural rubber	-100	Buna S	-100	Buna N	-100	Neoprene GN	-100
Stearic acid	4	Bardol	2.5	Bardol	2.5	Stearic acid	0.5
Zinc oxide	5	Circo oil	2.5	Circo oil	2.5	Accelerator 552	0.1
Antioxidant	1	Zinc oxide	50	Zinc oxide	5	Carbon black	50
Captax	0.75	Santocure	1.25	Santocure	1.25	Neozone A	2
Sulphur	2.85	Sulphur	2.0	Sulphur	2	Light calcined magnesia	4
Carbon black	50	Carbon black	50	Carbon black	50	Circo oil	5
Press cure at 280° F.		Press cure at 280° F.		Press cure at 280° F.		Zinc oxide	5
						Press cure at 287° F.	

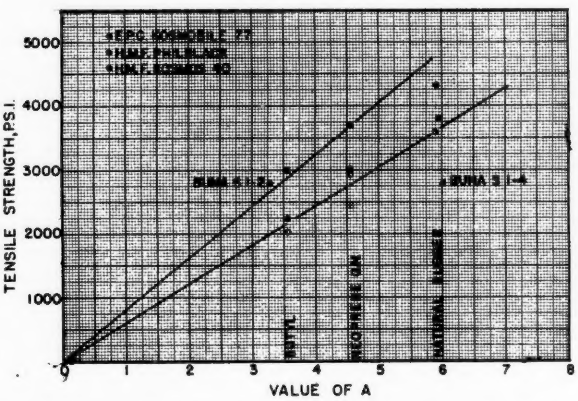


Fig. 5. Observed vs. Curve for Calculated Tensile Strength Values —Channel Black Kosmobile 77 and Furnace Blacks Philblack and Kosmos 40—Data of Drogin, Grote and Dillingham. (Each Curve Represents a Different Pigment and Pigment-Rubber Ratio)

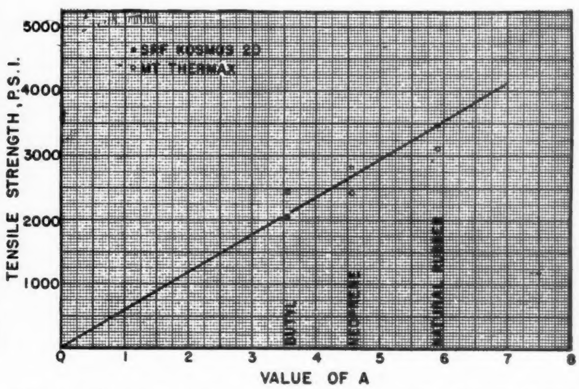


Fig. 6. Observed vs. Curve for Calculated Tensile Strength Values —Furnace Blacks Kosmos 20 and Thermax—Data of Drogin, Grote, and Dillingham

est error in the case of neoprene, which has a density of 1.23 in comparison to Butyl at 0.92 and natural rubber at 0.91.[9] It is therefore believed that neoprene, which has been placed throughout as the 1-4 polymer, does contain a certain amount of the 1-2, and that its agreement with the curve as the 1-4 polymer is somewhat fortuitous.

Summary and Conclusions

The effect of the number of carbon atoms or chain length per unit weight of rubber molecule on the tensile strength of a vulcanized rubber has been considered. The tensile strength of the various rubbers appears to be proportional to this function within the region studied, as far as can be decided by the data at hand. If this is true, both Buna S and Buna N should exceed the strength of natural rubber if the addition during polymerization could be made entirely 1-4. The 1-4 polymer would be free of the cross-linking encountered in the butadiene rubbers where 1-2 addition has occurred. This would eliminate the prevulcanized character of the present Bunas; they would process smoothly, and pure gum compounds of high tensile strength could be made. The problem of synthesizing the 1-4 polymer is therefore regarded as the most challenging of those facing the rubber chemist today.

The interest and helpful criticism of L. H. Cretcher, W. A. Hamor, and E. R. Weidlein, of the executive staff of Mellon Institute, are gratefully acknowledged.

[9] Wood, Bekkedahl, and Roth, **Ibid.**, 34, 1291 (1942).

Successful Four-Year Storage of Hevea Latex

John Mc Gavack[1]

PHYSICAL and chemical tests have proved that natural rubber latex can be stored in bulk for more than four years and still meet every specification for quality, processing, and use. This accomplishment is the result of improved methods of preservation and storage developed prior to Pearl Harbor and given their first long-term test during the war years. It is significant to manufacturers because now they can store latex in large quantities without fear of loss.

The War Storage Problem

The sudden curtailment of natural rubber latex imports, when Japan started her Far East conquest, certainly furnished a fine opportunity to find out just how good our *Hevea* latex preservation processes were. We had what we thought were excellent methods and they had been tested rigorously during summer and winter periods in the United States when storage facilities were inadequate and consumption had been greatly reduced. This test our latex had withstood in fine shape. The open question, however, was what would be the effect of long-time storage, now a necessity because of the war.

Early in 1942 our commercial people descended on our technical group with such questions as: "How can we store *Hevea* latex for long periods?" and "How long can latex be stored?"

The "How" is answered by this paragraph in a report I wrote on June 9, 1942: "When latex is stored, it should be free from bacteria; have a sufficiently high pH level, depending upon the type being preserved; should be maintained at uniform total solids; should be held at a uniform temperature as low as practicable; should have minimum exposure to oxygen; should be stored in vessels properly sterilized and containing smooth side walls; and should not be subjected to either direct or indirect light."

"How long" was a more difficult question, and the government and our commercial people persisted until our necks were out a mile. However we did give them an answer, and again I quote from this June 9 report:

"The answer to this question depends a good bit upon how the latex has been stored. We have had latices that have held up in good shape after 10 years of storage. However, at the end of 10 years there was some deterioration due mostly to the non-rubber constituents but in part because of the hydrocarbon itself. It has been our experience that with proper storage conditions, the latex can be maintained in good condition for three years, in a fair condition for five years, and that it is quite possible to maintain latex for 10 years and still be able to use it. We do not advise, however, this long period of storage unless absolutely necessary."

Preservation Methods Used and Results

We have, in 1946, definite answers to both these questions. Physical tests, made on a lot of our type 957, a standard commercial type of centrifuged *Hevea* latex, when first received in November, 1941, and again in November of 1945, are given in Table 1 and show clearly that the preparation and the care taken during storage had accomplished the desired result. We truly have a great latex and have proved that well-prepared latex can be stored for more than four years without deterioration. It is reasonable to suppose that it could be stored for much longer periods with proper handling and care.

The actual preservation method used depends upon an immediate disinfection of latex right after tapping and the addition of a sufficient amount of preservative immediately after centrifuging. This quick disinfection is brought about by the addition of a powerful disinfectant to the latex as soon as possible after tapping. After centrifuging, ammonia is added to bring the pH up to 10.3. The real secret in processing latex, however, is never to let the latex proteins be attacked by bacteria.

Cleaning Underground Storage Tank at North Bergen, N. J. Gas Masks Are Necessary because of Ammonia Fumes

It is not my purpose to go into the details concerning how this storage was undertaken. If anyone would like to receive a copy of the June 9, 1942 report, I shall be pleased to send a copy to anyone writing me.

However a brief résumé may be interesting. In addition to chemical treatments, it was highly essential that all apparatus and equipment used from the time of tapping until the latex was finally transformed into a finished rubber product be thoroughly cleaned and kept as free from bacteria as possible. For example, collection pails were sterilized; drums, tank hose, storage tanks used were treated with low-pressure steam and later with either aqueous or gaseous formaldehyde; the storage tanks on ocean freighters that brought the latex to America were scrubbed with soap and Lysol and then painted with a thin coat of hot paraffin; unloading equipment was kept in shape in the same meticulous manner. The bulk latex was then stored in large underground concrete tanks located at North Bergen, N. J. The fact that these tanks were underground was important because they maintained a more even and lower temperature than above ground storage. Before latex was introduced into these tanks, they were sterilized with formaldehyde and lined with a thin coat of paraffin. Periodically these bulk tanks were stirred so as to maintain a uniform dispersion and prevent undue concentration near the surface with a corresponding loss in preservative.

Physical and chemical tests were made from time to time in order to keep the proper evaluation of the product and to provide information for supplemental treatments when necessary.

(Continued on page 817)

[1] General Laboratories, United States Rubber Co., Passaic, N. J.

A. C. S. Division of Rubber Chemistry Spring Meeting

THE general meetings of the American Chemical Society, suspended during the last year of the war, will be resumed with the one hundred and ninth meeting in Atlantic City, N. J., April 8-12. The Division of Rubber Chemistry will participate in this meeting with technical sessions scheduled for the afternoon of April 10, and morning and afternoon sessions on April 11 and 12. The headquarters of the Division of Rubber Chemistry will be at the Ambassador Hotel. The technical sessions and the business meeting will be held at Convention Hall and the Divisional banquet in the main ballroom of the Chelsea Hotel.

One of the special features of this meeting will be the Charles Goodyear Lecture to be delivered on April 11 at 10:55 a. m. by Waldo L. Semon, of The B. F. Goodrich Co., who was selected to receive the Charles Goodyear Medal for 1944. The Award and the Lecture were of necessity postponed with the cancellation of the 1944 Fall Meeting of the Society and the cancellation of all meetings during 1945. The subject of Dr. Semon's Goodyear Lecture will be "Research Leading to Commercial Synthetic Rubber."

As a result of the cancellation of both national meetings in 1945, the Secretary of the Society has ruled that under the provisions of the Constitution of the Society, all officers of divisions elected in 1944 shall continue in office until their successors can be selected in regular elections during the next annual (fall) meeting. The chairman of the Division of Rubber Chemistry, W. A. Gibbons, of United States Rubber Co., will therefore preside at this Atlantic City meeting, and he has asked that all committees appointed during 1944 carry over also for another year.

The Division is collaborating with the Divisions of Cellulose; Colloid; Organic; Paint, Varnish and Plastics; and Physical and Inorganic Chemistry and is arranging a symposium entitled "The High Polymer Forum." This forum is sponsored by the Division of Paint, Varnish and Plastics Chemistry and is scheduled for the morning and afternoon of April 9 and the morning of April 10.

Meeting Details

Hotel reservation cards have been sent to all members and associate members of the Division of Rubber Chemistry by the secretary, H. I. Cramer, Sharples Chemicals, Inc., Philadelphia, Pa., and the preliminary program for the whole meeting appeared in the January 10 issue of *Chemical and Engineering News* together with a complete list of available hotels and their rates. A complete program for the entire meeting will also appear in the March 10 issue of *Chemical and Engineering News*.

The committee on local arrangements consists of Harry G. Bimmerman, E. I. du Pont de Nemours & Co., Inc., as chairmen; with S. M. Martin, Thiokol Corp., entertainment; W. H. Ayscue, du Pont, banquet; L. K. Youse, L. H. Gilmer Co., housing; and W. B. Dunlap, Lee Rubber & Tire Corp., tickets.

Since this will probably be a record year for attendance, the demand for tickets is expected to exceed banquet facilities. In order to give members and associate members of the Rubber Division priority on the purchase of tickets, the sale will be limited to members and associate members, and tickets will be limited to one per member until March 15. After that date the tickets will go on general sale for members of the Society and guests. Requests will be filled in the order received, and no requests will be accepted unless postmarked on or before April 4. Forms for applications for banquet tickets were forwarded to members and associate members during the latter part of February.

It is expected that in accordance with the usual custom, officers of the Society will be invited to be present at this banquet of the Division of Rubber Chemistry.

Divisional Program Including High Polymer Forum

The program of the Division of Rubber Chemistry which starts on the afternoon of April 10, is given below and is preceded by the program for the High Polymer Forum in which the Division is cooperating in arrangements for this Forum. The titles of the papers to be presented at the High Polymer Forum are given together with their authors. Abstracts of the papers to be presented before the Division of Rubber Chemistry and their authors will be found follow this listing of the combined programs, under the heading of "Abstracts of Division Papers."

Program of High Polymer Forum and Division of Rubber Chemistry

April 9—Morning Session

Chairman, A. C. Elm — P. J. Flory, Presiding

HIGH POLYMER FORUM

9:00 a.m. Introductory Remarks by A. C. Elm and P. J. Flory.

"Disorder in Linear Condensation Copolymer Solids." W. O. Baker and C. S. Fuller.

"The Relative Activities of Ethylene Derivatives in Copolymerization." Frank R. Mayo.

"Some Recent Results in the Field of Copolymerization." Turner Alfrey, Jr.

"Partial Conversion Properties of Copolymers." Frederick T. Wall.

April 9—Afternoon Session
R. H. Ball, Presiding

2:00 p.m. **"Copolymerization of Vinyl Compounds with Dienes."** A. Goldberg, T. Alfrey, Jr., and W. P. Hohenstein.

"Copolymerization. The Composition-Distribution Curve." I. Skeist.

"The Viscosity of Dilute Solutions of Long-Chain Molecules. The Initial Concentration Dependence Constant." M. L. Huggins.

"The Thermal Polymerization of Methyl Methacrylate." C. Walling and E. R. Briggs.

"The Temperature Dependence of the Osmotic Pressure of Polyvinyl Chloride Solutions." P. Doty and E. Mishuck.

"A General Theory of Emulsion Polymerization with Respect to Reaction Loci." W. D. Harkins.

April 10—Morning Session
R. H. Ball, Presiding

9:00 a.m. **"The Thermal Polymerization of 2-Vinylnaphthalene."** J. M. Grim, W. E. Baldwin, and W. H. Hill.

"The X-Ray Fine Structure of Synthetic Rubbers." W. O. Baker and N. R. Pape.

"Elastic N-Substituted Polyamides." E. L. Wittbecker, R. C. Houtz, and W. W. Watkins.

"Chain Transfer in the Polymerization of Styrene. II. The Reaction of Free Radicals with Carbon Tetrachloride." R. A. Gregg and F. R. Mayo.

"Structural-Chemical Investigations of Rubbers by Stress Relaxation." R. D. Andrews and A. V. Tobolsky.

"Degradation of Vinyl Polymers." R. B. Mesrobian and A. V. Tobolsky.

April 10—Afternoon Session
W. A. Gibbons, Presiding

DIVISION OF RUBBER CHEMISTRY

1:30 p.m. Introductory Remarks by W. A. Gibbons.
1:40 p.m. Technical Session.

April 11—Morning Session
W. A. Gibbons, Presiding

9:00 a.m. Technical Session.

10:55 a.m. Charles Goodyear Lecture. Waldo L. Semon.
11:30 a.m. Technical Session.

April 11—Afternoon Session
W. A. Gibbons, Presiding
2:00 p.m.—Technical Session.

April 11—Evening
6:30 p.m. Banquet of the Division of Rubber Chemistry. Main Ballroom, Chelsea Hotel.

April 12—Morning Session
W. A. Gibbons, Presiding
9:00 a.m.—Technical Session.
11:45 a.m.—Business Meeting.

April 12—Afternoon Session
W. A. Gibbons, Presiding
2:00 p.m.—Technical Session.

Abstracts of Division Papers

The abstracts of the papers to be presented before the Division of Rubber Chemistry starting on the afternoon of April 10, together with the authors and their company or other affiliations, are given below:

Wednesday Afternoon—April 10

Purification and Emulsion Copolymerization of Isoprene. The determination of the rate of copolymerization was applied as a control to the purification of isoprene with the following results:

1. "Research Grade" and "Pure Grade" isoprene were prepared which, when copolymerized with styrene in the Mutual recipe, exhibited 11-hour conversions of 66 and 67% respectively.
2. These conversions compared very favorably with a conversion of 67 to 68% obtained with SO_2-purified isoprene.
3. The results indicated that both high and low boiling inhibiters were removed from the isoprene by large-scale slow distillation.
4. The polymerization technique applied to isoprene was improved to the point where duplication of conversions of $\pm$ 0.2 to 0.3% could be attained. This technique employing crown cap bottles is described in detail.
5. The physical properties of the various isoprene samples, such as refractive index, density, and freezing point, duplicated closely those published by the National Bureau of Standards.
6. The rubbers produced with pure isoprene exhibited a tendency to overcure, which can be readily corrected by proper compounding, and exhibited improved heat-aging properties as compared with GR-S. C. F. Fryling, Phillips Petroleum Co.

Emulsion Polymerization of Diene Hydrocarbons. The results obtained in an extended investigation of the emulsion polymerization of diene hydrocarbons to yield rubber-like polymers are summarized. Variables which may affect the rate of polymerization or properties of the products, such as purity of reagents, monomer-water ratio, type and concentration of emulsifying agents, pH of emulsion, method of preparation of emulsion, temperature of polymerization, catalysts and certain added chemicals, product yield, method of coagulation, and processing of coagula, are discussed.

Convenient forms of equipment for the small-scale preparation, compounding, and testing of new types of elastomers are described.

Data obtained with elastomers formed by emulsion polymerization of such dienes as 1,3-butadiene, isoprene, and 2,3-dimethyl, 1,3-butadiene, alone and in mixtures are presented.

The properties of elastomers obtained from mixtures of butadiene with various amounts of a few typical vinyl compounds are discussed. The influence of the structure of the second monomer and variations in the monomer ratio upon typical properties such as stress-strain relations, freeze resistance, and chemical resistance is indicated, with conclusions regarding the effect of certain substituent groups. Attention is called to some methods for distinguishing between true interpolymers and mixed polymers.

Graphs are presented showing the influence of both primary and secondary catalysts upon the polymerization rates.

The influence of modifying agents, such as mercaptans, upon the polymerization and the plasticity of typical copolymers is considered, with a comparison of the effects of various mercaptans.

The products formed from butadiene with more than 200 representatives of various classes of polymerizable compounds, such as hydrocarbons, substituted hydrocarbons, hydroxy compounds, aldehydes, ketones, ethers, carboxylic derivatives, nitriles, amides, and heterocyclic compounds, have been investigated. These results are summarized in this report. H. W. Starkweather, A. S. Carter, F. B. Hill, Jr., V. R. Hurka, P. A. Sanders, H. W. Walker, and M. A. Youker, du Pont.

Properties of Lactoprene EV. The compounding and curing characteristics of Lactoprene EV elastomer (95% ethyl acrylate—5% chloroethyl vinyl ether copolymer) and certain properties of its vulcanizates are described. The polymer compounds satisfactorily on a hot six- by 12-inch laboratory mill, provided a suitable release agent, such as stearic acid, is used to insure retention of the stock on the front roll. Curing time of the compounded stock at 298° F. varies from 30 minutes up, depending on the formulation. Slow-curing stocks tend to adhere strongly to the mold unless a lubricant is used. Mold lubricant customarily employed with other synthetic rubbers are usually unsatisfactory for Lactoprene EV. A special lubricant designed for use with this product is described.

Special properties in which Lactoprene EV vulcanizates surpass the diene synthetics are emphasized in this paper. Heat-aging tests demonstrate that the product is outstanding in its resistance to high temperatures. Suitably formulated vulcanizates exhibit serviceable tensile properties after 300 hours at 300° F. Lactoprene EV is also superior in its resistance to paraffinic hydrocarbons. When immersed in a standard reference oil at 70° C. for 168 hours, its volume increase is of the order of 2%. It swells markedly in aromatic hydrocarbons and the lower alcohols, however, and the volume increase in water is comparatively high (14% in seven hours at 25° C.). T. J. Dietz, W. C. Mast, R. L. Dean, and C. H. Fisher, Eastern Regional Laboratory, United States Department of Agriculture.

Copolymers of Dimethyl Styrene and of Vinyl Fatty Acid Esters with Butadiene. After studying a large number of raw materials for synthetic rubbers, two classes of materials, a p-dimethyl styrene and vinyl fatty acid esters have given promise of producing rubbers of improved physical properties. The first, p-dimethyl styrene, has been copolymerized in emulsion with butadiene in various ratios. The copolymers are easily processed, and their tensile strength is greater than the corresponding butadiene-styrene copolymers. The tensile strength increases with the amount of dimethyl styrene at least up to one part of dimethyl styrene to two parts of butadiene. The polymerization was carried substantially to completion. Better properties were obtained with lower temperatures of polymerization.

Vinyl fatty acid esters have been prepared from acetylene and the acids from drying and non-drying oils. These vinyl esters do not polymerize readily but copolymers with butadiene are readily formed by emulsion polymerization containing up to 20% vinyl esters. These copolymers are rather soft and not particularly interesting. Tripolymers from butadiene and vinyl esters with styrene possess rubber-like properties. When vinyl esters of the drying oils are used, the polymers exhibit good resistance to cut growth. When acrylonitrile is used as the third component, oil resistant rubbers are obtained. Ten to fifteen percent of vinyl esters are used to the best advantage. P. O. Powers, Armstrong Cork Co. (now at Battelle Memorial Institute).

Some Properties of Silastic[1] at Elevated Temperatures.

[1] Dow-Corning Silicone Rubber.

The physical properties of some Silastic compositions as a function of temperature are presented in comparison with the properties of natural rubber and some of the present synthetic rubbers under the same conditions. The properties studied include stress-strain relations, hardness, elasticity, permanent set or non-recoverable deformation under stress, dielectric strength, ozone resistance and solvent resistance. The data shows how these properties of the various polymers change with temperature. The properties of natural rubber stocks fall off rapidly at temperatures above 100° C. Compositions of neoprene and Buna N polymers are stable in the range up to 150° C. Silastic maintains physical stability up to 250° C. C. M. Doede, G. DiNorscia, and A. Panagrossi, Connecticut Hard Rubber Co.

Improved Types of GR-S Using Rosin Soap as an Emulsifier. It is well known that standard GR-S utilizes fatty acid soap as an emulsifier, in turn converted to free fatty acid when flocculated. During the early phases of the government synthetic rubber program, it was shown that rosin acid soap could be substituted for fatty acid soap in the GR-S system with formation of a polymer of good quality. Interest in this development was accelerated when it was observed that the polymer was quite tacky compared with standard GR-S, and limited plant-scale production was inaugurated during June, 1943, under the code of GR-S, X-10.

Subsequent experience in the building of tires from the rosin soap GR-S showed that considerably better quality was obtained because of superior adhesion between cords and adjacent carcass compounds. Further evaluation has demonstrated additional advantages, notably, better tensiles in low black compounds or with non-black pigment loadings. The better reenforcement noted has sometimes resulted in better tread wear. Rosin soap GR-S is now available in unlimited quantities under the designation GR-S-10. A non-discoloring, non-staining variation is also available under the code GR-S, X-273.

Because of the lack of free fatty acid, the rosin soap polymers break down somewhat slower and require more mastication. For the same reason curing rates are slower than with standard GR-S, and this condition must be compensated for by adjustment of accelerator ratio. W. S. Coe and J. L. Brady, Naugatuck Chemical Division, U. S. Rubber.

Continuous Buna S Preparation. An investigation of the continuous preparation of Buna S on a laboratory scale was begun in May, 1941, at the Esso Laboratories of the Louisiana Division of the Standard Oil Co. of New Jersey. The continuous process was investigated in one-stage, three-stage, and five-stage systems; the additional stages were added to minimize "short-circuiting." Runs varying from 45 to 618 hours were made during which the number of stages, percentage conversion, amount and manner of catalyst and modifier addition, hydrogen ion concentration, and water to hydrocarbon ration were the principal variables investigated. The data from these runs indicate that:

1. Under comparable conditions and at the same conversion levels the products from the one-, three-, and five-stage operation showed very similar properties. The product evaluation data did not show the appreciable advantage expected in increasing the number of stages.

2. Under conditions equivalent to those employed in batch operation, the reaction rates were slower, but could be increased by increasing the reaction temperature and by inter-stage injection of additional catalyst.

3. A Buna S of good quality equivalent to that obtained in typical batch operation was produced either by lowering the conversion level or at higher conversion levels by certain modifications of the reaction conditions, including; (a) inter-stage addition of modifier, (b) inter-stage addition of catalyst, (c) decreasing the water to hydrocarbon ration, and (d) lowering the pH of the soap solution.

The results of this study indicated that the continuous production of Buna S was entirely feasible. J. J. Owen, C. T .Steele, and P. T. Parker, Standard Oil Co. of N. J., Louisiana Division, and E. W. Carrier, Standard Oil Development Co.

Development of a Better Processing GR-S. Early studies on plastication of GR-S and related polymers revealed that hot breakdown of the raw polymer gave a resulting compound which tubed smoother and exhibited less swelling at the die. It was also observed that under certain conditions, hot plastication caused the raw polymer to become less viscous and progressively less soluble in benzene, indicating the formation of a cross-linked molecular structure accompanied by chain scission.

It has now been found possible to duplicate and surpass the effects of plastication by controlling molecular structure during polymerization.

A critical experiment illustrating this principle lies in the comparative processing properties of standard GR-S of 50 Mooney viscosity and a GR-S produced by blending a very high Mooney component and a very low Mooney component to the same 50 Mooney value. The latter will be found to tube much smoother, exhibit greatly reduced calender shrinkage, and swell considerably less at the die. The presence of a benzene insoluble gel component may be demonstrated in the blended polymer as well as on inordinately wide molecular weight distribution.

Another approach for producing a similar alteration in molecular structure lies in the introduction of a difunctional cross-linking agent such as divinyl benzene into the polymerization formula. Under these conditions comparable improvements are noted. This approach has proved to be more immediately practical than the blending technique, and a polymer of this type has been made in copolymer plants on a production scale and is currently available in limited quantities.

This new type of improved processing GR-S can be used to best advantage in blends with standard GR-S in any proportion depending on the properties desired.

Inasmuch as its molecular pattern differs radically from standard GR-S, certain alterations in compounding are necessary to realize maximum potentialities. D. L. Schoene, A. J. Green, E. R. Burns, and G. R. Vila, Naugatuck Chemical.

Thursday Morning—April 11

The Effect of Polymolecularity on the Deformation Characteristics of Butyl Polymers. It is well known that variations of conditions and courses of reaction during polymerization affect the heterogeneity of molecular weight of high polymeric materials. The degree of heterogeneity profoundly affects the deformation characteristics of elastomers. Because Butyl polymers are linear molecules and relatively stable, the isolation of fractional molecular weight components, their blending, and study of deformation characteristics are facilitated. Narrow fractions as well as blends of varying molecular weight distribution (for a constant average molecular weight) were studied under conditions of constant deformation rate and constant load.

Under constant deformation rate conditions it was noted that the temperature required to reduce appreciably elastic component of deformation is directly related to molecular weight. In other words, even the highest molecular weight polymers would be capable of forming operations if sufficiently high temperatures could be tolerated. When average molecular weight is held constant, decreasing the molecular weight distribution results in more thermoplastic materials. From this observation it can be postulated that the narrower the molecular weight distribution, the higher is the viscosity average molecular weight that can be tolerated for a given level of processability.

Under conditions of constant load, a method has been devised for experimentally isolating the elastic and viscous components of deformation. By this technique it is shown that a contraction in molecular weight limits (for a constant average molecular weight) is followed by a reduction in elastic deformation while viscous flow remains constant. In other words variations in molecular weight distribution are manifested in differences in elastic modulus, but the plastic flow is dependent only on average molecular weight. Thus a plastometer method for indicating a viscosity or weight average molecular weight is available, for the logarithms of the viscous flow rates obtained by this tech-

nique are related to the square root of the viscosity average molecular weight by an expression similar to the Flory equation, $\log \eta = A + CM_w$. R. L. Zapp and F. P. Baldwin, Standard Oil Development.

The Effect of Molecular Weight Distribution on the Phyical Properties of Natural and Synthetic Polymers. Weight average molecular weight distributions of natural polymers have been determined and compared with those of butadiene-styrene copolymers. The maxima in weight distribution of unmilled, naturally occurring rubbers appear at dilute solution viscosities which range from less than one-half in the case of Solidago leavenworthil to ten for No. 2 ribbed smoked sheet.

Plastication softens the gel of *Hevea* rubbers, but increases its amount; while cold milling reduces the amount of gel. The weight distribution of *Hevea* is lowered and broadened very much by plastication. Cold milling also lowers the viscosity at which the maximum in weight distribution appears, but does not eliminate it.

The tensile strength of the vulcanizates rises rapidly with dilute solution viscosity up to a value of about 1½. At higher viscosities the curve for the relation between tensile strength and viscosity begins to level off. The efficiency of the polymers continues to rise in this range in which the ultimate strength does not depend on chain length. The tread wear in tires also continues to improve with increased dilute solution viscosity in this range.

The weight average molecular weight distribution of GR-S is such that about 40% of the polymer consists of material below one in dilute solution viscosity. This material has been shown to have a deleterious effect on physical properties and tread wear. Indications were obtained that the gel portion of GR-S was not so detrimental as the low molecular weight material. B. L. Johnson, Firestone Tire & Rubber Co.

Correlation of Tensile Strength with the Brittle Points of Vulcanized Diene Polymers. The data presented in this report were collected to determine the validity and extent of the general observation that changes in diene copolymer composition which improve the tensile strength, cut crack growth resistance, etc., of the vulcanizate, do so at the expense of a higher brittle point.

A number of butadiene and isoprene copolymers were prepared in varying ratios with styrene, vinylpyridine, acrylonitrile, mono-, and dichloro-styrenes. Stress-strain determinations at 27° and 90° C. and brittle point tests were made for tread vulcanizates of each copolymer.

To illustrate the dependence of tensile strength upon the brittle points, the maximum tensile strength observed for each rubber was plotted against ΔT, where ΔT represents the difference (in °C.) between the temperature at which the tensile determination was made and the brittle point of the compound. As ΔT decreases, the tensile strength of all the isoprene and butadiene copolymers studied increases. Thus those polymers with the highest brittle points have the highest tensile strength, both at room and elevated temperatures.

Points for all the butadiene copolymers form one band upon this plot. Those for isoprene rubbers fall slightly lower, i.e., with a lower tensile strength for a given brittle point. Tensile values of *Hevea* tread stocks at several temperatures are included on the same graph, showing a marked superiority in tensile strength at a given ΔT for the *Hevea* compound.

The data show that the commonly observed low hot tensile strength of GR-S compounds is not the result of an abrupt weakening at higher temperatures, but merely that the temperature of measurement (93° C. in this laboratory) is farther from the brittle point of the rubber than in the case of copolymers with higher tensiles at 93° C.

Similar measurements of Neoprene GN and Butyl compounds showed the points of tensile strength *vs.* ΔT to fall within the band observed for the butadiene copolymers.

A discussion is given of the way in which other physical properties may fit into this relation and of possibilities of overcoming the limitations observed. A. M. Borders and R. D. Juve, Goodyear Tire & Rubber Co.

Osmotic Pressure Measurements with Polydimethylsilicone Fractions. A sample of high molecular weight polydimethylsilicone

$$\begin{array}{ccccccc} & CH_3 & & CH_3 & & CH_3 & \\ & | & & | & & | & \\ - & Si & -O- & Si & -O- & Si & -O- \\ & | & & | & & | & \\ & CH_3 & & CH_3 & & CH_3 & \end{array}$$

has been divided into five fractions by precipitation from solution, using ethyl acetate as solvent and acetone as precipitant. The range of precipitant concentration within which most of this polymer is thrown out of solution is unusually narrow. This behavior is due to the predominance of very high molecular weight species in the polymer.

Osmotic pressure data have been obtained for solutions of the four highest molecular weight fractions in methyl ethyl ketone. The osmotic pressures of these solutions have a high temperature coefficient; in one extreme case a doubling of the osmotic pressure with a 10-degree rise in temperature has been observed.

The osmotic pressure data for the four fractions yield number average molecular weight values of 2.8×10^6, 1.5×10^6, 6.1×10^5, and 2.9×10^5. With such high molecular weights, it is surprising that only the highest molecular weight fraction shows any rubber-like elasticity; the other three fractions are soft plastic materials. D. W. Scott, General Electric Co.

X-Ray Fine Structure of Synthetic Rubbers. The physical properties of synthetic rubbers made from butadiene or isoprene polymers and copolymers differ so much from those of natural rubber that the crystallizing or ordering ability peculiar to *Hevea* was recognized nearly 20 years ago, by J. R. Katz, to be of profound technical significance. The meaning of this behavior of *Hevea*, to the present quest for good artificial rubbers, can be made more specific. Molecular order induced mainly by high, periodic forces between the chains only enhance tenacity at the cost of rubberiness. It raises brittle point and gives properties of a plastic. On the other hand the intrinsically weak interaction of natural rubber chains is so integrated, when stress is applied, that notable strength and "crystallinity" arise, without excessive stiffening.

Thus the crucial elements seem to be (1) easily attainable local order, (2) rapid order-disorder transformation as stress varies.

The first element was studied by interpretation of silver nitrate polydiene complexes (observed to form with *Hevea* by Kratky, Philip, Posnansky, and Schossberger[2]). The X-ray scattering of these complexes suggests that polarizable, double bonds in the polymer chains are so disposed, in adjacent chains, that ordered association with silver ions occurs. By contrast, characteristic but disordered patterns are found for silver nitrate-polymer complexes containing synthetic diene polymers and copolymers (except polychloroprene). Apparently chains in GR-S, polybutadiene, (polyisoprene, etc., show signs of order) lack the local arrangement, unstretched, necessary for order and reenforcement on stretching. For example, silver nitrate complexes have different structure with *cis* (higher coordination) than with *trans* (lower coordination) so that a *cis-trans* mixture in polybutadiene, as well as 1:2 addition, would presumably cause disordered complexes, as observed.

The second factor, rapid order-disorder transformation with varying stress, means that crystallites must be quickly destroyed by energy kT if the rubber is to relax after stressing and not stay oriented like a textile fiber. While speed and heat of retraction have previously been used to study this, another way is to see at what temperature usable rubbers disorder when stretched. This temperature range is 40-50° C. for Butyl and a model system, Paracon. Although higher values have been reported for *Hevea*[3] extensive crystallinity probably should not persist above 50° C., for a good rubber. W. O. Baker and N. R. Pape, Bell Telephone Laboratories.

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[2] **Naturwissen**, 26, 123, (1938).
[3] Von Susich, **Ibid.**, 18, 915, (1930).

Research Leading to Commercial Synthetic Rubbers. The Charles Goodyear Lecture. Waldo L. Semon, Goodrich.

The Sulphur Bond in Vulcanizates. I. Implications of Halogen Reactions. The reactions of the halogens, iodine chloride and bromine, with vulcanized rubber and GR-S under conditions similar to those commonly employed for iodine number determination have been studied in considerable detail and compared with the analogous reactions with simple sulphur compounds, including alkyl, alkyl-allyl, and allyl sulphides. Iodine chloride has been found to undergo a reaction with vulcanizates leading to the formation of hydrogen halide in direct proportion to the sulphur present; while bromine apparently does not. The reaction has been found to be accompanied by selective introduction of chlorine into the molecule, probably due to loss of HI from the ICl addition product together with some substitution.

A comparison of the behavior of simple rubber-sulphur or rubber-sulphur-organic accelerator vulcanizates with that of typical sulphides leads to strong support of the alkyl-allyl type of sulphide in these vulcanizates. The loss of unsaturation which accompanies vulcanization, either in the presence or absence of organic accelerators, corresponds to one double bond per sulphur atom.

The presence of zinc, with or without organic accelerators, effects a type of vulcanization with less loss of unsaturation.

The results are consistent with primary alpha-methylenic attack by sulphur as proposed by Farmer. (Note: The work reported in this paper was done on the Firestone Tire & Rubber Co. Ohio State Research Foundation Project at Ohio State University.) S. R. Olsen, U. S. Dept. of Agriculture, C. M. Hull and W. G. France, Ohio State University.

II. Mineral Sulphide as an Index of Disulphide Cross-Bonding. The reactions proposed by Armstrong, Little, and Doak to explain sulphur vulcanization in the presence of metal soap have been investigated under vulcanizing conditions in polyprene and simpler systems by measuring the mineral sulphide produced and, in the case of polyprenes, the accompanying modulus.

Dodecyl mercaptan was found to react with sulphur and zinc soap to produce mineral sulphide equivalent to the oxidation of about 90% of the mercaptan to disulphide; with excess mercaptan substantially quantitative conversion of sulphur or of zinc soap to mineral sulphide can be obtained.

Several simple olefins have been found to react readily with sulphur and zinc soap under vulcanizing conditions. The reaction is catalyzed by MBT. The mineral sulphide formed is believed to result, in the main, from conversion of the olefin to a substituted diallyl sulphide in agreement with a reaction mechanism proposed by Armstrong and coworkers.

The results with natural rubber furnish evidence for a disulphide bond between alpha-carbon atoms as an important and, in some cases, principal cross-link.

Experiments with GR-S indicate appreciable, but relatively less, disulphide cross-bonding, possibly due to greater ease of addition of the mercapto group, formed in the primary stage of vulcanization, to a double bond. (Note: As in the previous paper, the work reported here was done on the Firestone-Ohio State Research Foundation Project at Ohio State.) S. R. Olsen, C. M. Hull, and W. G. France.

Thursday Afternoon—April 11

Sulphur Linkage in Vulcanized Rubber. III. The Reaction of Sulphur with 2-Methyl-2-Butene. The reaction of 2-methyl-2-butene and sulphur has been studied as a model system for rubber-sulphur vulcanization. Using carefully purified sulphur and olefin, the reaction was carried out at 141.6° C. in shaken glass bombs in the absence of oxygen. The following conclusions were reached as a result of a study of the reaction rate and products:

1. The color changes with reaction time; yellow, orange, red, black, parallel those of rubber-sulphur stocks.

2. Rate of combination of the sulphur is directly proportional to reaction time as is the case in rubber-sulphur vulcanization.

3. The absolute reaction rate of 2-methyl-2-butene with sulphur is twice that of pale crepe with sulphur.

4. Olefin combination rate is not directly proportional to time.

5. Starting with equal molar quantities of olefin and sulphur, there is considerable unreacted olefin in the system when 100% of the sulphur has reacted.

6. Hydrogen transfer takes place in the primary reaction resulting in hydrogen-rich liquid products and much smaller yields of solid hydrogen-poor products.

7. The hydrogen-rich compounds are polysulphides, $R-S_x-R'$, where x varies from 2 to 6, and either R or R' or both may be alkyl instead of alkenyl.

8. The hydrogen-poor compounds appear to be of the type $C_nH_{n+1}S_3$, of which $C_5H_6S_3$ and $C_{10}H_{11}S_3$ have been identified. A cyclic acid anhydride in the sulphur system displaying thiono-thial tautomerism has been proposed for the structure of $C_5H_6S_3$.

9. Increased reaction time lowers the average value of x in the polysulphide products $R-S_x-R'$.

10. The higher the value of x in the polysulphide formula, $R-S_x-R'$, the more hydrogen is present. Milton L. Selker and A. R. Kemp, Bell Laboratories.

Balancing the Vulcanization of GR-S and Natural Rubber in GR-S-Rubber Mixtures. The supply of natural rubber for the next several years, together with certain technical advantages, will lead to the use of mixtures of natural rubber and GR-S synthetic rubber in tires and many other rubber products.

It is recognized that GR-S synthetic rubber requires higher dosage of accelerators than natural rubber to produce the same degree of vulcanization. This point raises the question as to what will happen when mixtures of GR-S and natural rubber are vulcanized. Data presented in this paper indicate that the natural rubber preferentially reacts with the vulcanizing agents so that the natural rubber component is over-vulcanized and the GR-S component is under-vulcanized. Two thiazole stocks, one all natural rubber, the other all GR-S, were formulated to give equal modulus at a given elongation. When these two formulae were combined in one mix, the modulus increased more than 50%.

By the use of a suitable accelerator activator with the thiazole, it is shown that this increase in modulus of mixtures can be considerably reduced or eliminated which points to the conclusion that the two elastomer components are more nearly equally vulcanized. With the known tendency of natural rubber vulcanizates to revert on overcure, a method to balance the vulcanization of mixtures should have technical value. A. P. Stubbs, Manhattan Rubber Division, Raybestos-Manhattan, Inc., and C. R. Johnson, Ridbo Laboratories, Inc.

Effect of Variable Black and Softener Quantities upon the Physical Properties of a GR-S Compound. The object of this work was to investigate rather thoroughly a variable Philblack A-softener system at a sulphur level of 1.75 parts per 100 parts of rubber and using a curing temperature of 280° F. Effectively to cover the range a series of 16 compounds was prepared wherein the black and the softener loadings were systematically varied. The black loadings investigated were 30, 50, 70, and 90 PHR, and the softener loadings were varied according to the black loading and comprised 0, 12½, 25, and 50% of the black loading.

Comparative data are plotted into a series of useful compounding curves using the black and softener variable as the X and Y axes respectively. A family of equal value curves for several of the major properties is portrayed from which it is possible to select the best black-softener combination to use for certain applications where the specific properties desired have been previously specified. L. R. Sperberg, L. A. Bliss, and J. F. Svetlik, Phillips Petroleum.

Mechanical Processing of Carbon Black and Resultant Effects in GR-S Compounds. It is desirable to pelletize or densify carbon black to facilitate its industrial use. Re-

cent experiments in conjunction with development work toward improved furnace black pellets have shown that significant changes can occur in analytical properties of carbon black, as its density is increased by mechanical work. Corresponding changes can be noted in the properties of GR-S stocks compounded with carbon black samples of increasing density.

Samples of carbon blacks have been subjected to increasing amounts of mechanical action. A substantial increase in the DPG adsorption, a slight increase in surface area, lower pH values, and a change in composition of the volatile content of the carbon black are a result of this mechanical work. Heats of adsorption measurements for nitrogen on these samples show no significant change.

Similarly, when this series of carbon black samples of increasing density is milled into GR-S, the following progressive changes in properties of the compounded stock can be observed:

A progressive decrease in the relative smoothness of roll mill sheeted stock and a corresponding increase in stock shrinkage.

A progressive decrease in the modulus of cured stock.

A progressive decrease in the electrical conductance of the cured stock.

The experimental data suggest that the densification of carbon black by mechanical action, can change the mode of dispersion of carbon black in rubber media. Evidence exists to show that the surface of the carbon black particle has been fundamentally altered. Significant, however, is the fact that smoothness, modulus, and electrical conductivity of carbon black-GR-S stocks can be seriously altered in the densifying or pelletizing processes. R. E. Dobbin and R. P. Rossman, Godfrey L. Cabot, Inc.

Butyl Inner Tubes—Performance and Effect on Tire Life. Over-the-road tests being run at San Antonio, Tex., on Stanco test cars using passenger-size tires under conditions of 10% overload and operating at 60 miles an hour, 24 hours a day, five days a week, reveal the following fact: Butyl inner tubes are approximately eight times better than natural rubber tubes in their "air holding" capacity under these severe test conditions.

Because of this property of Butyl inner tubes, new test procedures have been developed, making it possible to study the effect of maintenance of proper inflation pressure on tire performance. These new test procedures are discussed. Test results indicate that the maintenance of proper inflation pressure, afforded by Butyl tubes because of their superior air retention, will result, under these severe test conditions, in an increase in tread life of approximately 10%. Results have been obtained at both 60 miles an hour and 40 miles an hour.

The "growth" of Butyl *vs.* natural rubber tubes in service has been studied and is discussed.

The superior retention of physical properties of Butyl compared with natural rubber under severe laboratory aging conditions has been translated to service aging in actual over-the-road performance. Road tests indicate that the superior retention of properties on aging of Butyl yields an inner tube exhibiting increased puncture and "blow-out" resistance. I. E. Lightbown and L. S. Verde, Stanco Distributors, Inc., and J. R. Brown, Jr., Standard Oil Development Co.

Styrene-Diene Resins in Rubber Compounding. The chemical and physical properties of Pliolite S-3, one of the several resinous copolymers of styrene with butadiene, are described. This resin is compatible with natural and several synthetic rubbers. As a reenforcing resin in mixtures with rubber, it is valuable for improvement of smoothness on extrusion or calendering and for reduction of shrinkage. Methods of mixing various rubbers with the styrene-diene resin are described.

Compounding procedures for rubber-resin mixtures are briefly described. Extensive data are tabulated illustrating the effect of Pliolite S-3 in both GR-S and natural rubber compounds upon hardness, stiffness, extrudability, tensile strength, and impact resistance.

Although the resin is brittle at room temperatures, in mixtures with rubber (up to 50/50), it does not greatly raise the brittle point or increase the rate at which the mixture stiffens with reduction in temperature. Brittle points and temperature-moduli data are plotted to illustrate this behavior.

Electrical properties and moisture absorption values of the resin are reported, indicating its usefulness in mixtures with low water absorption rubbers as electrical insulation. The ability of Pliolite S-3 to impart increased hardness and rigidity to rubber compounds with retention of considerable resilience has prompted its use in rubber and synthetic rubber footwear. Other applications of Pliolite S-3 are indicated in which advantages to the use of cyclized natural rubber appear. A. M. Borders, R. D. Juve, and L. D. Hess, Goodyear.

Friday Morning—April 12

Plasticizing GR-S and Natural Rubber. Some organic accelerators, such as DPG and Pip-Pip, under some conditions, as well as some antoxidants, have been known to have pronounced softening or plasticizing effects on rubber. Oxygen has been shown to be largely responsible for the softening or plasticizing of rubber during milling. It undoubtedly plays a major part in the hot oven softening of rubber and synthetic rubber of the butadiene-styrene copolymer type. The hydrazines and thiophenols or aromatic mercaptans and some of their derivatives are known to be plasticizers or peptizers for rubber. Certain aromatic mercaptans or their zinc salts and nitrosophenolic type of chemicals, with hot milling, have been used to plasticize GR-S.

Another class of chemicals: namely, the di(o-acylamidophenyl) disulphides, have been found to plasticize GR-S during hot milling. The most active of the class, di(o-benzamidophenyl) disulphide or o,o'-dibenzamido diphenyldisulphide, is effective above 240° F. (116° C.) in both GR-S and natural rubber. o,o'-dibenzamidodiphenyldisulphide has practically no odor, is non-toxic, and does not discolor white or light colored stocks.

Data are given to illustrate its effects on the plasticity of GR-S and natural rubber as well as the effects on the cured physical properties of typical stocks. Its effect on GR-S gel build-up in hot processing is also shown. Possible uses to increase production capacity and improve processing are outlined. Arnold R. Davis, American Cyanamid Co.

High Solids Synthetic Latex Directly from the Reactor. In prewar days consumers were accustomed to receive natural latex as a concentrate of 62-65% total solids obtained from the 38% total solids latex produced by the tree. Concentrated latices have the advantage of lower shipping costs, more rapid drying rates, thicker films from each dip, and less shrinkage and cracking of film.

Until recently butadiene-styrene-type high-solids latices have also been obtainable only by concentration of dilute latices. Relatively expensive and time-consuming processes involving considerable investment in equipment are required for such concentration.

It is now possible to produce stable, fluid latices of 55-60% total solids directly in the reactor. The average particle size of these latices (over 2,000 A average diameter) aproaches that of natural latex. The mechanical stability is markedly superior to that of natural latex. Laboratory tests indicate that films from these latices are equivalent to those from creams of Type III in film tensiles, low temperature properties, and ease of handling.

Several difficulties, unique to high-solids polymerizations, have been encountered and overcome. Although all latices exhibit a slight viscosity peak during polymerization, this phenomenon is marked for low water formulations, which tend to gel solidly at about 20% total solids. This condition has been overcome by special agitation, increased reaction cycle, and careful balance of emulsifiers, stabilizers, and viscosity reducing agents. The increased monomer loading of the reactor leads to correspondingly greater heat evaluation at any given time, which is greater than can be removed by normal jacket cooling. This has necessitated longer reaction cycles and installation of reflux condensers

which constantly condense vaporized butadiene and return it to the system. Reaction rates can be varied within wide limits by regulating the balance between emulsifiers and stabilizers. Careful control of this balance is necessary to maintain latex stability. This stabilizer balance also exerts a marked effect on the quality of laid films, apparently through their effect on yield point.

High solids latices are fundamentally more foamy than dilute latices, making stripping of residual monomers extremely difficult on a plant scale. To reduce residual monomers, conversion has been carried practically to completion by adding a "booster" solution late in the reaction at the point where the rate of reaction normally falls off sharply. This "booster" consists of additional modifier, catalyst, and stabilizer.

Up to the present time it has been necessary for the consumer to pay considerable premium for concentrated latices. These successful developments of high solids latices produced in the reactor will practically eliminate this premium and furnish a material equal in quality to creamed latices. F. D. Chittenden, C. D. McCleary, H. S. Smith, Synthetic Rubber Division, U. S. Rubber.

Continuous Process Preparation of GR-S Materbatches with Non-Black Pigments. The use of GR-S type of synthetic rubbers in products requiring reenforcement with pigments other than carbon black is extensive. Aqueous dispersion of these pigments and subsequent coprecipitation with rubber from mixtures in latex has proved desirable in cases where dry mixing of the pigment in GR-S is difficult or where optimum degree of dispersion with subsequent quality improvement is best obtained through incorporation in the liquid phase.

Experimental work leading to the successful preparation of GR-S latex masterbatches is reviewed. Some of the variables affecting the process are: the type of pigment and its concentration in the water dispersion to be mixed with the GR-S latex, the solids content of the latex, the type of emulsifier in the latex, the nature and concentration of the coagulant and stabilizer, the coagulation temperature, and the mechanical treatment of the coprecipitate during and subsequent to coagulation. All of these variables must be carefully controlled since they influence pigment dispersion and retention and coagulum characteristics. The latter must be made adaptable to existing washing and drying facilities.

Equipment and methods are described by which the more common non-black pigments, especially clays and calcium silicates, may be incorporated into GR-S in a continuous process through the medium of aqueous dispersion and subsequent coprecipitation.

Large-scale plant preparation of a non-discoloring GR-S clay masterbatch is discussed. Physical properties, processing characteristics, and uniformity of clay loading are given. E. L. Borg, J. C. Madigan, R. L. Provost, and R. E. Meeker, U. S. Rubber.

The Effect of pH on the Physical Properties of Films from Synthetic Latices. The control of the pH of rubber latex compounds has long been realized to be of utmost importance in producing compounds with good mechanical stability. Jordan has adequately defined the mechanism of pH compounding of rubber latex with the so-called "KOH Number." The system is, however, not applicable to synthetic latices where, owing to the lack of natural proteins and, therefore, ammonia stabilization, zinc oxide can be used as a compounding ingredient without adversely affecting stability.

Although "KOH Number" compounding does not apply to synthetic latices, proper control of the pH of neoprene and GR-S compounds greatly affect the physical properties of their films and their dipping qualities. Experimental work indicates that films prepared from neoprene and GR-S compounds whose pH is adjusted into the range 10.0 to 10.8 exhibit maximum tensile strength and modulus and minimum swell in water, compared with those prepared from other compounds at higher or lower pH's.

Polarographic analysis of the serum from compounds whose pH had been varied 9.0 to 13.0 was studied, together with the effect of pH on zinc in solution. It can be shown that the increase in physical properties can be correlated with the changes in the nature of the zinc complexes in aqueous solution. It was found that zinc can exist in at least three distinct forms between pH 6.0 and 12. R. H. Walsh and I. W. Dobratz, du Pont.

The Creaming of Neoprene Latex. Neoprene latex mixed with solutions of certain hydrophilic colloids spontaneously separates into two layers on standing. The lower layer contains the greater concentration of neoprene, but in other respects the process is comparable to the creaming of natural rubber latex or of milk and has been termed *creaming* for this reason.

The creaming of neoprene latex can also be produced by the action of electric fields or by cooling. It appears that some factor of fundamental importance is associated with all three methods of producing creaming. It is postulated that in every case the viscosity must be increased until within a certain critical range for creaming to take place. This small increase in viscosity will retard Brownian motion so that clustering can occur. If the viscosity is too low, clusters do not form; if it is too great, separation is pervented. Data are presented to show that the viscosity of neoprene latex-hydrophilic colloid mixtures can be correlated with the creaming behavior of the mixtures. H. K. Livingston, du Pont.

Alkyl Phenol Resins as Tackifiers for GR-S. *Tack* is understood in this discussion to mean the tendency of two surfaces of a substance to adhere when brought together with slight force. This property is utilized in fabricating rubber goods. While natural rubber, when properly handled, possesses a high degree of tack, GR-S polymer is almost completely non-tacky, and various materials have been added to impart tack to the compound.

The most effective tackifiers appear to be condensation products of p-alkyl phenols with acetylene, aldehydes, or sulphur dichloride. The sulphide type was the first one studied in this laboratory. Certain representatives of this type were found to be effective when used with zinc rosinate or related materials. A number of resins were made from various alkyl phenols with varying molecular ratios of sulphur dichloride and sulphur monochloride. Only sulphur dichloride was found to be satisfactory and only p-alkyl phenols, in which the alkyl group was Butyl or higher. From these observations with the aid of Fisher-Hirschfelder atomic models, the tackifier molecule is pictured as a crumpled, fairly rigid chain of alkyl phenol residues with the hydroxyl groups on one side of the molecule.

The same generalizations apply to the alkyl phenol-aldehyde resins though as a class they are more effective and the addition of zinc rosinate is not required.

With the assumption that the p-alkyl phenol-aldehyde resins are linear polycondensation products, the chain length, as indicated by intrinsic viscosity, appears to correlate with tackifying properties through a certain range. The alkyl phenol sulphides have lower intrinsic viscosities and are less active tackifiers. G. E. P. Smith, Jr., and J. C. Ambeland, Firestone.

Chemical Derivatives of Synthetic Rubbers. Drastic restriction of the commercial use of natural rubber during the war for chemical derivatives such as the chlorinated, hydrochlorinated, and cyclized products prompted the study of synthetic rubbers for this purpose. It was found that polyisoprene and other isoprene-containing synthetic rubbers behaved chemically very much like natural rubber because of the similarity in structure; whereas GR-S and other butadiene-containing synthetic rubbers were either non-reactive or showed a different behavior.

A process for chlorinating emulsion polyisoprene was developed which gave a product very similar to chlorinated natural rubber with respect to chlorine content, viscosity, thermal stability, solubility, and general utility in protective coatings and rubber-to-metal adhesives. GR-S, however, could not be satisfactorily chlorinated under the same conditions.

A process for cyclizing emulsion polyisoprene in almost exactly the same way as previously used for natural rub-

bers was developed to give a product which for most applications was equivalent to cyclized natural rubber. Under the same conditions GR-S was completely unaffected. Work was also done in converting monomeric isoprene or isoprene/styrene systems directly into a resinous product with a stannic chloride or boron fluoride catalyst in an attempt to duplicate cyclized isoprene polymers.

Emulsion polyisoprene hydrochlorinates readily in a manner very similar to natural rubber. Whereas rubber hydrochloride is an excellent film-forming material, polyisoprene hydrochloride is too weak and rubber-like to be of interest for this purpose although it has other interesting properties, such as low moisture vapor transmission. GR-S adds hydrogen chloride very slowly, if at all. In conclusion, synthetic polyisoprene shows a striking similarity to natural rubber in chemical behavior; whereas GR-S is either nonreactive or reacts with difficulty. J. D. D'Ianni, F. J. Naples, J. W. Marsh and J. L. Zarney, Goodyear.

Fundamental Studies on the Oxidation of GR-S and Other Elastomers. The effect of air oxidation at 100° C. on the following uncured emulsion polymers has been studied: polyisoprene, polybutadiene, isoprene-styrene, and butadiene styrene. Based on changes in benzene solubility and intrinsic viscosity, the net effect of oxidation of isoprene polymers was degradation or chain scission similar to that occurring with uncured natural crepe rubber; while with butadiene polymers further polymerization or cross-linking predominated.

Changes in benzene solubility, intrinsic viscosity, swelling index, and iodine number which occurred during air oxidation of the uncured GR-S hydrocarbon are reported. Oxidation of GR-S in the absence of antioxidant results in the rapid formation of a highly brittle, cross-linked polymer. Data are presented to show that oxidation in the presence of an antioxidant may cause appreciable chain scission in GR-S. Oxygen uptake and antioxidant consumption during aging of GR-S have been measured by direct analytical methods. Air oxidation of GR-S containing phenyl beta-naphthylamine caused a marked decrease in the secondary amine content of the acetone extract. Appreciable quantities of the antioxidant appear to combine with the polymer during aging.

Changes which occur in the infrared absorption spectra of unsaturated polymers during oxidation are reported. This technique presents a new method for studying the mechanism of oxidation of polymeric materials. The present theories of the mechanism of oxidation of unsaturated polymers are reviewed, and the infrared absorption spectra data are interpreted in terms of these theories. A possible mechanism of antioxidant action is suggested. John O. Cole and James E. Field, Goodyear.

Friday Afternoon—April 12

The Role of Carbon in the Oxidation of GR-S Vulcanizates. Carbon black is shown to be a catalyst for the oxidation of GR-S vulcanizates. The increased rate of oxygen absorption with higher loading is shown to be caused by the increase in carbon surface area. Furthermore the increased oxygen absorption is shown to cause a correspondingly greater deterioration of physical properties. The relative activity of a unit of surface varies with the type of carbon, and furnace carbons are shown to be only 55% as active as channel blacks in promoting oxidation. A theoretically derived equation is presented which correlates oxygen absorption with surface area and loading. Hugh Winn,[4] J. Reid Shelton, and David Turnbull, Case School of Applied Science.

Crack Growth in GR-S Treads—Its Relation to State of Cure and Composition. Two of the most serious troubles encountered with GR-S in tire use are excessively rapid crack growth and high heat build-up in the tread composition. One characteristic may be improved at the expense of the other by variations which affect the state of cure. The relation between the two for a simple composition containing the normal loading of EPC or MPC black was found to be:

$$\text{Log Flex} = .0126\ \Delta T + 4.28$$

for a specific set of conditions for measuring heat rise and crack growth. For other variations in composition which do not involve other carbon blacks the relation was found to be:

$$\text{Log Flex} = 5.42 + \frac{\Delta T}{336} - \frac{M}{2000}$$

where M is the 300% static modulus. A knowledge of these relations permits the ready evaluation of experimental polymers or suggested compounding modifications which are intended to provide a more favorable balance between these properties. A. E. Juve, The B. F. Goodrich Co.

Dynamic Surface Cracking of GR-S Vulcanizates in Ultra-Violet Light. A dynamic flexing device for studying the cracking characteristics of GR-S vulcanizates is shown and described. Specimens cracking during dynamic flexing while exposed to ultra-violet light illustrate the effectiveness of certain organic compounds in minimizing this deficiency of GR-S vulcanizates.

The flexing mechanism is based on the premise that a constantly changing surface film increases the probability of formation of cracks and increases the rate of growth of those already formed. A double turntable fixed to a double cam provides angular motion which insures uniformity of radiation and also causes linear displacement, which is necessary to stretch the surface of the specimens. Ordinary dumbbell tensile specimens are stretched over specially designed rods arranged concentrically near the outer diameter of the turntable.

It was observed that 0.25-1.0% concentrations of certain ketone-amine condensations minimized greatly the tendency to crack at the surface. Correlation of results of exposure to summer sunshine with exposure to the artifically generated ultra-violet light is shown. M. C. Throdahl, Monsonto Chemical Co.

A New Accelerated Weathering Test for Rubber. It has recently been established that the major agencies responsible for the deterioration of rubber on outdoor exposure are two in number: viz., a light-energized oxidation by the oxygen and a multiple cracking of the rubber by the ozone of the atmosphere, the latter occurring only when the material is under tension. The overall result in any one location depends on the relative preponderance of these two factors. Light colored goods are more likely to suffer from the former than rubber protected from light by incorporation of carbon black, such as cable jackets, hose, and the like. Accelerated tests for weathering of rubbers therefore logically call for separation into two distinct procedures, one for susceptibility to light-energized oxidation, the other for liability to cracking by the ozone in the atmosphere.

Based on extensive studies of deterioriation of rubber by weathering, these effects are discussed, and conditions for an accelerated test for susceptibility to atmospheric ozone cracking are proposed. The method of generating an atmosphere of dilute ozone of the required constant concentration is described along with the device employed in the exposure of the specimens. A rapid method of estimation of the ozone content of atmospheres of very low concentration on which the test depends is also described, and comparative data on natural rubber and GR-S compounds are given. J. Crabtree and A. R. Kemp, Bell Laboratories.

Measuring the State of Cure of Neoprene Vulcanizates. Gibbons, Gerke, and Tingey[5] showed that the state of cure of natural rubber vulcanizates could be measured from the rate of recovery of "racked" samples. The state of cure of neoprene vulcanizates can also be determined by the same test. Higher states of cure are indicated by increasing rates of retraction with respect to temperature. The T-50 test apparatus is used to obtain necessary data. This test can be used for production control in the manufacture of neoprene items. Retraction-temperature curves constructed

[4] Firestone Fellow.
[5] **Ind. Eng. Chem.** (Anal. Ed.), 5, 279, (1933).

from the data on these tests are indicative of the possibilities of crystallization of neoprene vulcanizates during long exposures to moderately low temperatures. More precise measurements of the effects of compounding ingredients on the curing characteristics of neoprene compounds can be made. The test should be particularly useful in classifying the accelerating and retarding tendencies of plasticizers. Don B. Forman and R. R. Radcliff, E. I. du Pont de Nemours & Co.

Quantitative Determination of Inhibiters in Polymers by Ultra-Violet Light Absorption. The determination of N-phenyl-2-naphthylamine in polymers, such as Butyl, GR-S, and Perbunan, is made by dissolving the polymers in suitable solvents and measuring the ultra-violet absorption of these polymer solutions. Isooctane is the preferred solvent for Butyl; while ethylene dichloride is preferred for the Buna-type polymers. The optical density of the solutions of known polymer content are measured at three wave-lengths, i.e., at wave lengths of a maximum absorption and two adjacent minima absorptions This permits correcting for linear "background" absorption without actual measurement thereof for all materials other than the inhibiter.

An equation for % inhibiter, which includes the maximum and two adjacent minimum optical densities, the specific extinction coefficients of the inhibiter and a coefficient n dependent on the wave lengths, will be given.

This type of background correction is especially beneficial in analyzing the inhibiter content of polymers which have been subjected to oxidizing conditions for long periods of time; otherwise a measurement of the optical density of the polymer solution at maximum absorption is often adequate to permit a close approximation of the inhibiter content of the polymer.

The method is rapid and accurate and may be extended to materials of antioxidant nature other than N-phenyl-2-naphthylamine. L. T. Eby and F. W. Banes, Standard Oil Development.

Heats of Adsorption on Carbon Blacks. While certain rubber reenforcing properties of carbon black can be interpreted in terms of particle size, others, notably increase of modulus, cannot be adequately described on this basis. It has often been suggested that the specific activity of the carbon black surface must play a significant role in reenforcement. However experimental confirmation of this point of view has been extremely meager. A comprehensive investigation of the surface activity of a number of carbon blacks of varying reenforcing ability has been undertaken. The present paper describes some of the preliminary results of this investigation.

The differential heats of adsorption measured at-195° C. for nitrogen, oxygen, and argon on four carbon black samples have been determined as a function of amount of gas adsorbed. The first increments of all adsorbates are adsorbed on reenforcing channel black with a heat of approximately 4,400 calories per mol. This value decreases to 2,300 calories at a volume of adsorbed gas corresponding to 0.8 to 1.0 monolayers as calculated from the Brunauer, Emmett, and Teller theory. After this point the heat values drop sharply and approach the heat of liquefaction of the adsorbate. Removal of the chemisorbed oxygen and hydrogen from the carbon black surface does not affect these values. Heat treatment sufficient to bring about partial "graphitization" of the channel black does not appreciably alter the total extent of surface, but does markedly alter the nature of the surface as evidenced by the absence of high initial heat values such as were obtained with the reenforcing carbons.

Semi-reenforcing furnace blacks give heats of adsorption intermediate between those obtained with the channel black and the "graphitized" black.

Measurements are being extended to include saturated and unsaturated hydrocarbons as adsorbates. Preliminary values with butane and butene-1 at 0° C. show a similar dependence on fraction of carbon black surface covered. No specific effect of the olefinic linkage has been observed as yet. R. A. Beebe and J. Biscoe, Amherst College, and W. R. Smith and C. B. Wendell, Cabot.

Storage of Latex

(Continued from page 808)

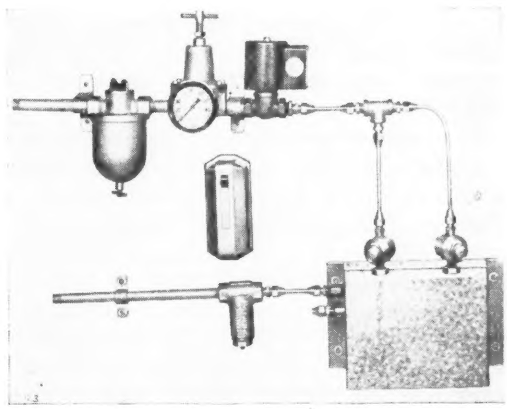
COMPARATIVE TESTS TYPE 957 HEVEA LATEX

	1941	1945
Total solids, %	63.0	62.8
Ammonia content, %	.59	.65
pH	10.28	10.28
KOH number	.57	.65
Viscosity (centipoises @ 25° C.)	36.0	35.7
Mechanical stability, min.	4.0	2.0
Film odor*	5	5
Latex odor*	5	4.5
Surface tension (dynes)	36.2	....

* 5 is equivalent to 100% rating.

Summary

It is a tribute to both Rubber Reserve Co., now the Office of Rubber Reserve, Reconstruction Finance Corp., and the War Production Board, that they took the rubber industry's advices in the care and handling of latex. Both these governmental agencies extended to the latex industry every support and facility that could be made available to preserve our then important reserve of liquid *Hevea* latex. To instrument the execution of industry's recommendations, Rubber Reserve took over the nation's stockpile of liquid latex on October 1, 1942, and accepted the responsibility for its proper storage and handling.



Two-Nozzle Humidifier

New Industrial Humidifying Unit

THE new industrial humidifying unit produced by Spraying Systems Co. introduces a departure from conventional methods in that the entire compact unit is delivered ready for installation. It produces a finely atomized humidifying spray and is said to be highly efficient and unusually low in cost. The unit is made in two or four nozzle units with humidistat control; the nozzles can be set at various angles to increase efficiency of moisture distribution. Siphon-type humidifying nozzles are used which utilize compressed air, mixed externally, producing an exceedingly fine, round (full cone) spray.

"The Vulcanization of Rubber with Phenol Formaldehyde Derivatives. I and II." S. van der Meer. Communications of the Rubber Foundation, Delft, Holland. Nos. 47 and 48, May, 1944. 16 and 20 pages, respectively. Part I reviews the importance of phenol formaldehyde resins as vulcanizing agents for rubber and describes the introductory investigations which led to the methylene quinone theory of vulcanization. Part II describes studies on the vulcanizing properties of various phenol formaldehyde derivatives, including phenol-dialcohols, substituted methyl phenols and their esters, and compounds closely related to substituted methyl phenols.

EDITORIALS

What Kind of Rubber Policy?

ALTHOUGH the government's Inter-Agency Policy Committee on Rubber had not yet made public its recommendations for a national rubber policy late in February, the probable direction that these recommendations will take was becoming evident from independent statements of various federal agency and industry leaders. This country's policy on rubber, as it will be recommended by the Policy Committee, will be definitely nationalistic, since the ownership and the control of a large part of the synthetic rubber producing plants are expected to be retained by the government for a rather long period. Such action presupposes the continued use of a sizable amount of general-purpose synthetic rubber by the rubber goods manufacturing industry, even after natural rubber is available in unlimited amounts. Under such conditions continued regulation in the rubber goods industry will be required.

Research and development on synthetic rubber under federal supervision will obviously be carried on for a longer time than previously anticipated, but a distinction will probably be drawn between research work on general-purpose rubbers as a government responsibility and research on special-purpose rubbers as a field for private enterprise. The respective fields are defined in the existing "Cross-License Agreement (Buna Rubber)," and unless a change is made in this Agreement, all of the participating companies will share in each other's and any research results from work sponsored by the government in universities and research institutes. The Cross-License Agreement will require modification to permit licensing by Rubber Reserve of government plant operators for longer than the war period.

Government-owned plants for the production of the special-purpose rubbers, such as neoprene and Butyl, will probably be disposed of to private industry in the not-too-far-distant future. The result of the competition of these rubbers with natural rubber has pretty much been decided in favor of the former; their field of usefulness is distinct from that of natural rubber, and there is no justifiable reason why their production under government auspices should not be continued any longer than necessary.

The importation, control, and allocation of natural rubber will probably remain a government function for an extended period since this is directly related to the operation of the synthetic plants for the production of general-purpose rubber and the maintenance of a strategic stockpile of natural rubber. It would seem to follow, therefore, that the usage of natural rubber in the United States will not reach its prewar volume for a considerable period of time.

The reader of this editorial may rightfully ask by this time, what is the purpose of this speculation on natural rubber policy even before the actual facts are known? It is just this, the Inter-Agency Policy Committee can only recommend. In order to implement the recommendations and establish any policy as a law of the land, legislation will be necessary. Whether the suppositions presented above are correct or not, the point remains, when the recommendations are made, the industry, its workers, and the general public must register its agreement or disapproval with the Congress in order that the best legislation possible may be written. Laws are often much easier to make than they are to change.

When Will the War Be Over?

DURING the war it was understandable that information on foreign and domestic production of rubber and rubber products should be classed as secret and confidential and its use restricted, but the seeming continuation of such a policy, several months after hostilities have ceased, is not conducive to aiding reconversion, nor does it seem to have any justification from a government viewpoint.

If, as it appears likely, we are to have continued government ownership and control of the greater part of our synthetic rubber industry and also government control and allocation of our importation and use of natural rubber, regular monthly reports on these activities are in order. The Department of Commerce collects and disseminates data on foreign and domestic activities in rubber, but three-fourths of foreign rubber reports now being prepared or collected are classified as secret or confidential. No reports are being released at present, and the date of future possible release is declared as indefinite.

Because of the delicate state of balance of our economic system during the early postwar period, it is generally agreed that certain of the federal government's war powers must be continued, but in the field of government-controlled rubber production and importation, why are present results and future prospects still pretty generally cloaked in wartime secrecy? How much rubber has been shipped from the liberated areas; how was it distributed, and why? What is the present production of synthetic rubber and rubber products in the United States? Our Canadian neighbor reports regularly on imports and exports of crude and manufactured rubber. Why don't we?

Scientific and Technical Activities

Second Meeting of Division of High Polymer Physics, A. P. S.

THE Division of High Polymer Physics of the American Physical Society held its second meeting as a part of the two hundred and seventieth meeting of the parent society, at Columbia University, New York, N. Y., January 24, 25, and 26. An attendance which varied between 150 and 300 at the different sessions of the Division heard a program of 26 papers on various aspects of theoretical and applied investigations on the physics of rubber, plastics, textiles, and other high polymeric materials. Although discussion was limited because of the extensive program, much interest was evidenced by the audience in most of the papers presented. W. F. Busse, General Aniline & Film Corp., chairman of the Division, presided at the opening session and at the business meeting on January 26.

Business Meeting and Election of Officers

The officers of the Division for 1946, elected prior to the meeting, are: chairman, H. A. Robinson, Armstrong Cork Co.; vice chairman, S. L. Gerhard, United States Rubber Co.; secretary, W. James Lyons, Firestone Tire & Rubber Co.; and treasurer, Lawrence A. Wood, National Bureau of Standards. The executive committee consists of the following members, in addition to the above officers: R. Bowling Barnes, American Cyanamid Co.; Dr. Busse; and J. H. Dillon, Firestone. Drs. Busse and Dillon were formerly chairmen of the Division.

Membership in the Division now totals about 300 persons. A motion to combine the program and reviewing committees was passed subject to the approval of the Council of the A. P. S. It was tentatively agreed that the papers presented at this meeting of the Division would be published in the *Journal of Applied Physics*, probably in April.

Abstracts of Papers Presented

Abstracts of papers presented at the meeting, considered to be of special interest to readers of INDIA RUBBER WORLD, follow:

Thermal Diffusion of Polymers. Experiments on thermal diffusion of high molecular weight polymers in solution were performed using the Clusius-Dickel arrangement. It was found that whereas molecules of small molecular weight have a thermal diffusion coefficient of the order of 1% of the ordinary diffusion coefficient, both coefficients are of the same order of magnitude for polymers. It was also found in the special case of polystyrene that the thermal diffusion coefficient increases with increasing molecular weight, indicating that thermal diffusion methods can be used for fractionation purposes as well as for the observation of the molecular weight distribution curve. The question whether thermal diffusion of molecules with the same molecular weight depends also on their form, i.e., branched or straight chain, has not yet been answered.

The instruments used are cylindrical in form, the hot and cold cylinder concentric with a narrow interspace. Other experiments have shown that packing of the interspace may have practical advantages. The thermal diffusion method also seems appropriate for the purification of liquids from small amounts of impurities. The work has been done in collaboration with A. Bueche and was supported by the Rubber Reserve Co. P. Debye, Cornell University, Ithaca, N. Y.

X-Ray Diffraction by Potassium Laurate Solutions. (A Contribution to the Mechanism of Emulsion Polymerization.) This paper described the results of an X-ray diffraction study, mostly at small scattering angles, of aqueous potassium laurate solutions with and without other added substances. The soap concentration was varied over the range 10 to 50%, which includes the phase change from isotropic to anisotropic "middle soap." The added materials include KCl up to 2.0 weight normal and more than 30 hydrocarbons and hydrocarbon derivatives. The hydrocarbons were added in some instances up to a concentration of one mole per mole of soap. These experiments were part of a study of the role of soap in emulsion polymerization. E. W. Hughes, Shell Development Co., Emeryville, Calif.

The Mechanical Properties of Fibers. The stress-strain behavior of textiles was interpreted quantitatively in terms of a model with a viscous element in parallel with one spring and in series with a second. Such a viscous element is of the non-Newtonian type required in plastic flow.

The treatment of more complicated conditions of straining gives rise to equations best treated by the superposing of elementary processes. For any restraint, methods were given for computing the stress-strain curves from the elementary processes. Henry Eyring and George Halsey, Textile Research Institute Laboratories, Princeton, N. J.

Stress-Relaxation of Compressed Cork. The stress-relaxation of corky materials is of theoretical significance for the understanding of such two-phase (corky material + air) systems and is of great practical interest since these materials are commonly used as gaskets, seals, etc. Stress-relaxation was studied at various degrees of compression and at temperatures ranging from 30 to 200° C. The experimental data were obtained from an automatic stress-relaxation machine which employed the principle of a chainomatic balance. It was found that the stress-time curves for various compressions could be obtained from each other by multiplication. This experimental fact is generalized by the statement that the stress is a product of two functions. The first factor is essentially identical with the S-shaped load-compression curve of cork and independent of time. The second factor was shown to be a linear function of log t and to be independent of compression.

The linear stress-log time curve was found to persist over a wide range of times and to continue until the stress had decayed to zero at the higher temperatures. The decay time, as obtained either by actual experiment or by extrapolation, was shown as a function of temperature. This gave a fairly complete picture of the stress-time-temperature behavior of cork under compression. S. L. Dart and Eugene Guth, University of Notre Dame, Notre Dame, Ind.

Statistics of Cross-Linked Polymers. The present statistical theory of molecular distribution in highly branched and cross-linked polymers was critically reviewed. The existing theory was considered to depend on two assumptions. The first, that all similar functional groups are equally reactive, becomes invalid for dilute solutions or for diffusion-controlled reactions. The second, that no cyclic structures can form, is more serious and must be removed before truly cross-linked polymers can be treated, but the mathematical difficulties are formidable.

Experimental observations of gel points were compared with the theory. For polycondensations agreement is tolerably good so that the statistical formulae may be applied with some confidence to these reactions prior to the gel point. Such an application has already been made to a study of the viscosities of branched polyesters. The theory has now been extended to deal with a general polycondensation reaction involving any number of components. For addition polymers the theory is generally poor because its basic assumptions are seriously violated.

Finally the necessity of an improved theory for the gelled state was emphasized. Flory's treatment, though qualitatively attractive, appears not to be generally applicable. It was concluded that cyclic structures must be specifically considered in the basic formulation of the theory. Walter H. Stockmayer, Massachusetts Institute of Technology, Cambridge, Mass.

Some Thermodynamic Properties of Slightly Cross-Linked Gels. It has been shown recently[1] that a measurement of the deswelling of slightly cross-linked gels by high polymer solutions affords in principle a new method of determining the number-average molecular weights of polymers. In order to assess the merits of this method it has been necessary to explore the behavior of gels in some detail. Amount of cross-linking agent, size of the sample, percentage of soluble material present in the gel, variation of swelling ratio in pure solvent for a series of supposedly identical gels, and influence of solvent type were among the factors studied.

Measurements of the equilibrium swelling volumes of a series of identi-

[1] R. F. Boyer, J. Chem. Phys., 13, 363 (1945).

cal gels in a wide range of solvents afford a convenient method of evaluating solvent power or solvent-polymer interaction. This is done in terms of the parameter μ_g which arises in the theory of gels. Some 50 solvents were examined in this regard. Determination of μ_g for solvent-non-solvent mixtures led to some interesting results. All the work reported was confined to styrene-divinyl benzene gels. R. F. Boyer and R. S. Spencer, Dow Chemical Co., Midland, Mich.

The Determination of Polymer-Liquid Interaction by Swelling Measurements. The interaction of polymers and liquids can be fairly well characterized by the value of the quantity μ, commonly used in thermodynamics of polymer solutions and evaluated from osmotic pressure measurements. The Flory-Rehner theory of swelling relates the amount of swelling of a slightly cross-linked polymer in a liquid to μ and a parameter M_c the average molecular weight between cross-links. M_c may be determined for a cross-linked polymer from its swelling volume in a solvent in which osmotic pressure measurements with the non-cross linked polymer have given the value of μ. The cross-linked polymer, thus calibrated, can be used to obtain the μ value for other liquids by measuring its swelling volume in them.

This procedure has been carried out on polyvinyl chloride which can be cross-linked by heating. Calibration in three different liquids gave comparable values of M_c, thus checking the Flory-Rehner theory. The quantity μ was determined at two different temperatures for 50 liquids. The value of μ and the temperature dependence of μ correlate well with the observed properties of the binary systems. The variations of μ with molecular weight in a homologous series were demonstrated. Paul Doty and Helen S. Zable, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

Electrostatic and Tensile Properties of Rubber and GR-S at Elevated Temperatures. A new apparatus for measuring electrostatic contact potentials on various materials at elevated temperatures is described. In the apparatus the electrostatic charge acquired by rolling a steel ball down the surface of a rubber test specimen on a heated inclined plane was measured when the ball dropped into the cup of a suitable measuring device such as the authors' electrostatic modulator. With this instrument the contact potential of both rubber and GR-S was found to become highly negative at elevated temperatures. This apparent "boiling off" of electrons and resultant disruption of electrostatic attractive forces within the material is much greater for GR-S than for rubber and probably accounts for the greater decrease in tensile of GR-S over rubber at elevated temperatures and is further confirmation of the electrostatic contact potential theory of reenforcement.

By the further application of this theory suitably dispersed compounding materials, such as certain proteins, finely divided silica and sodium silicate, which are in effect highly positive at elevated temperatures, have been found substantially to increase the hot tensile strengths of GR-S compounds. R. S. Havenhill, H. C. O'Brien, and J. J. Rankin, St. Joseph Lead Co., Josephtown, Pa.

Significance of the Stress-Temperature Relationships for Rubber. In the relaxation method of obtaining stress-temperature relationships, samples are relaxed at various constant relative lengths at a fixed temperature T^x for a fixed time t^x. Then the temperature T is lowered, and the corresponding change in the stress Z (force per unit original cross-section) measured. Until recently the dependence of the stress upon the variables T^x and t^x has been obscure. It was found that the stress as a function of the four variables L, T, T^x, t^x can be resolved into two factors F and G; the first depends on L and T only, and the second upon T^x and t^x only. This result shows that only the absolute value of Z depends upon the temperature T and the duration t^x of the relaxation, while the form of the dependence of Z upon L and T (i.e., the S-shape of the stress-strain curve) is independent of T^x and t^x. Thus the physical significance of the stress-temperature relationship is clarified.

The above factorization implies certain similarities in the families of curves obtained when some of the four variables are kept constant, i..e., when cross-plottings are made. For the simple case of pure stress relaxation $T^x = t^x$, the above factorization implies simply the similarity of Z-L curves at constant T and various t^x and of the Z-t curves at constant T and various L. The factor F is given by the kinetic theory of rubber elasticity; while the factor G may be interpreted as a function of the number of primary and secondary cross-bonds (varying with temperature and time) in the rubber network. Paul E. Wack, R. L. Anthony, and Eugene Guth, University of Notre Dame.

The Theory of Permanent Set at Elevated Temperatures in Natural and Synthetic Rubber Vulcanizates. A molecular thory was developed to describe quantitatively the permanent set taking place in thin samples of vulcanized natural and synthetic rubbers held at constant extension at elevated temperatures. Permanent set was considered to be the result of the formation, through the action of molecular scission and cross-linking reactions, of a dual molecular network in the rubber sample, in which the network chains are of two types: chains which are at equilibrium when the sample is at its unstretched length, and chains which are at equilibrium when the sample is at its stretched length. According to the theory, the amount of permanent set in a rubber sample is a function of only two quantities: the relative ratio of the number of chains of the two types, and the elongation at which the sample was held. Experimental data on permanent set for various rubber types and under different conditions were shown to be in good agreement with the theory. R. D. Andrews and A. V. Tobolsky, Princeton University, Princeton, N. J., and E. E. Hanson, Firestone Tire & Rubber Co., Akron, O.

The Crystallization of Unvulcanized Rubber at Different Temperatures. The crystallization and melting of unvulcanized natural rubber in the unstretched state have been investigated at different temperatures. Change of volume has been used as a quantitive measure of the extent of crystallization, and mercury-filled dilatometers containing the rubber have been used for the volume measurements.

Crystallization was observed to occur at temperatures between -50 and + 15° C. and to be most rapid at about -25° C. The final decrease of volume on crystallization was usually found to lie between 2.0 and 2.7%.

The melting of the crystalline rubber was found to occur over a range of temperature and to be strongly dependent on the temperature at which the crystals were formed. The temperature at which the beginning of melting occurs is from four to seven degrees above the temperature of crystallization. The range of melting is about 35 degrees at the lowest temperatures and decreases to about 10 degrees at the highest. The same range of temperature of melting was obtained regardless of the extent of crystallization. Lawrence A. Wood and Norman Bekkedahl, National Bureau of Standards, Washington, D. C.

Tackiness of GR-S and Other Elastomers. The deficiency of GR-S in "tackiness" resulted in a great deal of work in the rubber industry to improve this complex property, but practically all the work had to be evaluated by qualitative "hand tests" because quantitative tests were not available.

An analysis of the factors involved in the "tackiness" of various materials showed that different factors were critical in the so-called "tackiness" of rubber, paints, varnishes, printing inks, adhesive tapes, etc. A quantitative test was developed to measure the effects of rate of removal on the adhesion or "tackiness" of pressure-sensitive adhesive tapes over a 10° fold range of rates. This showed why the results of standard "adhesion tests" of tapes do not predict the relative behavior of the tapes under small forces acting for long times.

Another test was developed for the measurement of the "tackiness" of GR-S rubber which correlates well with the judgment of tackiness by hand tests, and it even works reasonably well with rough samples taken from a laboratory mill. With this test the effects of mastication conditions, aging, and of the addition of softeners and tackifiers on "tackiness" of GR-S (with and without carbon black) were studied.

The German tackifier "Koresin," which is now manufactured in this country, was found to be far more effective than rosin and similar materials formerly used and gave a tackiness approaching that of natural rubber. W. F. Busse, J. M. Lambert, and R. B. Verdery, General Aniline & Film Corp., Easton, Pa.

Stress-Time-Temperature Relations in Polysulphide Rubbers. Polysulphide rubbers of various internal structures have been investigated by measurement of continuous and intermittent relaxation of stress and by creep under constant load at temperatures between 25 and 120° C. Continuous stress-relaxation measurements indicate that these rubbers approximately obey the simple Maxwellian law of relaxation of stress, which indicates that one definite type of bond in the network struc-

ture is responsible for stress decay. The activation energy for the relaxation process in each of the polysulphide rubbers is nearly the same, indicating that the same type of bond is responsible for the relaxation behavior of all the polysulphides investigated. In contrast to the hydrocarbon rubbers, oxygen is not the cause of high temperature relaxation in polysulphide rubbers, nor does heating in air at moderate temperatures for times comparable to the relaxation time produce permanent chemical changes or changes in modulus.

Several possibilities regarding the mechanism of the relaxation process and the type of bond involved were considered in the light of the experimental results. M. V. Stern and A. V. Tobolosky, Princeton University.

Application of Infra-Red Methods in the Structural Examination of Synthetic Rubber. It was pointed out that the physical properties of a synthetic polymer are associated with variations in molecular structure which are dependent on the conditions of the polymerizing reaction and the monomers used. In some cases structural differences of significance for physical properties cannot be detected by infra-red methods because the relative number of chemical linkages affected is too small. An important structural detail which can be followed by infra-red analysis, however, is the relative amount of 1,2 and 1,4 polymerization occurring in polymerization reactions of butadiene. Absorption curves were reproduced to show the wide range in the relative amounts of these two structures. A description was given of an atempt to obtain a quantitative measure of this ratio by means of a calibration curve derived from known mixtures of pure octene 1 and octene 2. For polyisoprene, variations in the proportions of 1,4 and 1,2 or 3,4 structure also occur depending upon the type of polymerization. Comparison with *Hevea* and balata failed to disclose definite evidence of trans isomerism in synthetic polyisoprene.

Structural differences due to oxidation of polymers may be readily detected in infra-red spectra; hydroxyl and carbonyl groups are especially prominent. The effectiveness of antioxidant in preventing structural changes due to oxidation was shown in a series of absorption curves for samples of GR-S with and without antioxidant. When the samples were heat treated in air, pronounced structural changes occurred for the sample without antioxidant, but no perceptible changes were evident for the sample with antioxidant. On the other hand the antioxidant used (phenyl-beta-naphthylamine) was ineffective for stabilizing the structure toward ultraviolet light. J. E. Field, D. E. Woodford, and S. D. Gehman, Goodyear Tire & Rubber Co., Akron.

Viscometric Investigation of Dimethyl Siloxane Polymers. A series of dimethyl polysiloxane fluids including pure distilled known members of linear and cyclic structures up to 10 siloxane units in size as well as a series of intermediate oils of linear structure, whose number average molecular weights were independently determined, were studied viscometrically. The intrinsic viscosities were determined, and the Staudinger constant was evaluated. The molecular weights of several high viscosity polysiloxane fluids were estimated on the basis of this constant, and a good fit with the Flory melt viscosity relation was found. Arthur J. Barry, Dow-Corning Corp., Midland, Mich.

Some Fundamental Relationships between Intrinsic Viscosity, Diffusion and Sedimentation Constants and Thermodynamic Properties of High Polymer Solutions. Empirical relations previously proposed for the variations of the sedimentation and diffusion constants of high polymers were reviewed. It was stated that if:

$$s = \frac{s_0}{1 + k_s c}, \qquad D = D_0 (1 + k_D c),$$

then for dilute solutions:

$$k_s + k_D = \frac{2bM}{RT} + v_{sp}$$

where b is the slope of the reduced osmotic pressure curve, M the molecular weight of the polymer, and v_{sp} its specific volume.

Since in several instances k_D is small, while in some cases k_s is fairly well represented by the intrinsic viscosity, one may expect in general a certain parallelism between the latter quantity and the thermodynamic term. Analysis of a number of solutions of natural and synthetic polymers over a wide range of molecular weights and varying slopes b, showed the ratio between the thermodynamic factor and the intrinsic viscosity to assume values between one and two for most systems. Barring very poor solvents, a semi-empirical equation was proposed which relates the intrinsic viscosity to equilibrium properties of the polymer-solvent system, viz:

$$(1 - 2\mu)\frac{V_2}{V_1} = r\,[\eta]\,V$$

μ is the well known parameter in the expression for the activities, $\frac{V_2}{V_1}$ the volume ratio between the two components. $[\eta]\,V$ represents the intrinsic viscosity, based on volume fractions, and r is a factor which assumes values between one and two in the majority of cases considered. Robert Simha, National Bureau of Standards.

Thin Section Methods for the Electron Microscopic Examination of Cured Polymers. A method was described involving the use of the "Cyclone Knife" Ultramicrotome for the preparation of thin sections (0.1 to 1.0 micron) of cured rubber and other high polymer compounds. Such materials which do not permit the formation of film samples for the electron microscope owing to their insolubility may thus be examined in thin sections for pigment dispersion and other characteristics.

The Ultramicrotome, accessory apparatus, the preparation and mounting of the specimens for the electron instrument were described.

Micrographs of compounded polymers were presented to define the value of the method. H. C. O'Brien.

Attachment for Obtaining Angular Distribution of Scattered Light from Measurements with a 90-Degree Turbidimeter. A device was described which in conjunction with a 90-degree turbidimeter permits measurement of the angular distribution of the intensity of scattered light over the range of 145 to 115 degrees and 65 to 35 degrees. The apparatus consists of two mirrors by means of which the direction of the incident light beam can be varied over the required range. A discussion was given of methods of calibration and of typical results obtained. J. N. Wilson, Shell Development Co.

A Photoelectric Light Scattering Instrument and a Differential Refractometer for Measuring Molecular Weights. The method of determining particle sizes and molecular weights by light scattering measurements on solutions[2] is finding increasing fields of application. In order to obtain the necessary data quickly and conveniently an instrument has been developed which allows the required light scattering measurements to be taken on a routine basis. This apparatus was described. It measures transmission and the scattering of light at 90 degrees; two different schemes can be employed to obtain the angular intensity distribution of the scattered light.

A description was also given of a compensating refractometer used to determine the difference in refractive index of solvent and solution. The instrument, which is simple in design, gives a direct reading of the refractive index difference and has an accuracy of better than 10^{-5}.

The light scattering instrument has been tested using polystryene of known molecular weight and has been applied to study the change of apparent molecular weight (or particle size) of a series of polyvinyl ethers as a function of concentration in some cases, also a number of solvents. For a series of polyvinyl n-butyl ether samples which were studied, the relation between the intrinsic viscosity $[\eta]$ of the benzene solutions and the weight average molecular weight **M** determined by light scattering is $[\eta] = .365 \times 10^{-7}\,M^{1.45}$. P. P. Debye, General Aniline.

Thermal Expansion and Second-Order Transition Effects in High Polymers. III. Time Effects. It has been suggested[3] that the so-called second-order transition in high polymers is not an equilibrium phenomenon, i.e., a true thermodynamic singularity, but rather a rate effect. Confirmation of this point of view has been obtained by determining the equilibrium volume-temperature curve for polystyrene, i.e., the volume-temperature curve corresponding essentially to an infinitely slow rate of temperature variation. Such equilibrium curves exhibit no transition within the temperature range of from 20 to 140° C., whereas the same material shows a second-order transition at about 32° C. for rates of heating usual in thermal expansion measurements.

[2] P. Debye, **J. Applied Phys.**, 15, 338 (1944).
[3] T. Alfrey, G. Goldfinger, and H. Mark, **Ibid.**, 14, 700 (1943).

Two facts appear in agreement with the viscous flow theory of thermal expansion.[4] First, two mechanisms were found to operate in thermal expansion, at markedly different rates. One mechanism gave almost instantaneous expansion even at room temperature; whereas the other was extremely slow at room temperature, becoming more rapid as the temperature was raised. Second, the activation energy for the slower mechanism was found to be of the order of magnitude of that for viscous flow, considerably lower than the activation energy for high (or retarded) elasticity.

Volume-temperature curves at finite rates of heating were discussed in light of these findings. R. S. Spencer and R. F. Boyer.

A New Approach to the Theory of Relaxing Polymeric Media. A molecular theory of relaxing media was presented which gave an expression for the stress in terms of the strain history. At any given time the strain history produces a distribution in the internal strains which for mechanical properties can be characterized by a limited number of internal strain parameters. The second law of thermodynamics is used to define dissipation of energy at constant temperature, and explicit expressions for dissipation of energy for any strain history are obtained. Inasmuch as relaxation during straining causes an essential reorganization of structure, which is in fact the cause of dissipation, the kinetic theory of elasticity is extended to nonisotropic polymeric networks. A tensor expression for the stress-strain-time relations is thereby developed. M. S. Green and A. V. Tobolsky, Princeton University.

Application of Molecular Distribution Methods to the Statistical Mechanics of High Polymer Solutions. In the expression for the osmotic pressure of a solution as a power series in the concentration, the term in the second power of the concentration determines the deviations of dilute solutions from ideality. A general expression for the coefficient, A_2, of this term has been developed for high polymer solutions using the probability distribution function of the configurations of a pair of chain molecules.

In favorable cases it is found that the well-known Flory-Huggins equation arises as a first approximation, but that, in general, serious modifications to this equation must be made. These modifications arise from more complicated interactions of chain segments than are considered in the Flory-Huggins treatment and can be shown both theoretically and experimentally to be very considerable.

It can be further shown that A_2 must depend on the molecular size, according to a relation whose first two terms are

$$A_2 = A^{\circ}_2 (1 - k\, p^{\frac{1}{2}} A^{\circ}_2 / R^3)$$

where A°_2 and k are constants, p is the degree of polymerization, and R is the root-mean-square distance between chain ends. Bruno H. Zimm, Polytechnic Institute of Brooklyn.

[4] R. F. Boyer and R. S. Spencer, **Ibid.**, 16, 594, (1945).

Prizes Awarded in Chicago Group Contest

WINNING papers were identified and prizes presented in the Chicago Rubber Group's sponsored contest "On the Utilization (Reclaiming and Processing) of Cured Synthetic Rubber Scrap" at the Group's meeting in the Hotel Morrison, Chicago, Ill., January 25. First prize of $500, plus a special award of $1,000 from A. Schulman, Inc., went to Harry P. Burchfield, Naugatuck Chemical Division of United States Rubber Co., for his paper, "New Color Tests for the Identification of Natural and Synthetic Rubber Vulcanizates." Kathleen S. Rostler and Richard M. White, of the University of Delaware, won second prize of $300 for their paper entitled "Study of Reclaiming Oils with Regard to Swelling Action on GR-S and Natural Rubber." Third prize of $200 was presented to H. Harmon Gillman, of the Gates Rubber Co., for his paper, "Some Aspects of Reclaiming GR-S." Fourth place, or honorable mention, was awarded to L. D. Healy, consulting rubber chemist of Milwaukee, Wis., for his paper on "Utilization of Cured Synthetic Scrap Rubber."

Contrary to previous notice, the first-place paper by Mr. Burchfield will not be published in this journal. In accordance with the desires of the author before the prize papers were announced, his paper, under the title of "Qualitative Spot Tests for Rubber Polymers," was published in the December, 1945, Analytical Edition of *Industrial and Engineering Chemistry*. The paper will therefore not be reprinted in this journal owing to existing limitations on editorial space. The fourth place paper by Mr. Healy will appear in a future issue of INDIA RUBBER WORLD, as previously announced; while the second and third prize papers will be printed in *Rubber Age*.

Approximately 175 members and guests of the Chicago Rubber Group attended the cocktail hour and dinner preceding the presentation of awards and the reading of the winning papers. Decoding of the paper numbers to identify the winners and presentation of the awards were done by H. A. Winkelmann, chairman of the Group's contest committee, which also included K. E. La Point, E. T. Meyer, and B. W. Hubbard.

The closing date for papers submitted in the contest was August 1, 1945. The papers were sent to A. R. Floreen, vice president of the City National Bank & Trust Co. of Chicago, who coded them before transmitting copies to each of the three judges: J. W. Temple, of U. S. Rubber; G. K. Trimble, of Midwest Rubber Reclaiming Co.; and W. W. Vogt, Goodyear Tire & Rubber Co. After selection, the code numbers of the winning papers were reported to Bruce W. Hubbard, 1945 chairman of the Chicago Group, who in turn notified Mr. Floreen. The winning contestants were then informed by Mr. Floreen and requested to appear at the meeting. The contestants were not informed as to which prize they had won until the final decoding and presentation of awards.

The Chicago Group will hold a symposium on "The Use of Textiles in the Rubber Industry" on March 22 at the Hotel Morrison. The main speakers will be Henry S. Grew, Jr., vice president of Wellington-Sears Co.; W. W. Owen, rayon division, E. I. du Pont de Nemours & Co., Inc.; and W. H. Atkinson, Chicago branch manager of Owens-Corning Fiberglas Corp.

Thiazole Accelerator

GOOD-RITE ERIE, made by the B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O., is a mixture of aliphatic thiazyl disulphides, predominantly dimethyl thiazyl disulphide. This accelerator is a liquid and completely soluble in natural and synthetic rubbers. It is a scorch free, delayed action accelerator capable of being activated to give rapid, tight cures. Vulcanized compounds combine the good physical characteristics associated with thiazole-type acceleration with minimum hysteresis and low permanent set.

Owing to limited availability in the past, Good-rite Erie was restricted for uses where heat build-up was especially important, such as in carcasses of heavy-duty tires. While used principally with GR-S during the war, Good-rite Erie is equally good in natural rubber. The accelerator is especially recommended in applications where low heat build-up is an important service characteristic, as in tires. In addition it is an excellent all-purpose accelerator and is finding considerable use in belts and other mechanical goods.

Good-rite Erie may be used alone, or it may be activated with many other accelerators. The most economical secondary accelerators are the dithiocarbamates, thiurams, and their derivatives. Fatty acid is not necessary, but exerts an activating effect when present.

Atomic Energy Discussed

L. G. ELLIOT, of the Canadian National Research Council, spoke on "The Release of Atomic Energy" at a joint meeting of the Quebec Rubber & Plastics Group and the Montreal Paint & Varnish Production Club, held at the Ritz-Carlton Hotel, Montreal, P. Q., Canada, February 8. In his address on the present and possible future applications of atomic energy Dr. Elliot referred to the active part Canada played throughout the war in the production not only of the atomic bomb, but of penicillin, radar, new insecticides, jet propulsion, and other developments. Continuation of government subsidy of scientific research, particularly in the field of nuclear physics, was prescribed by Dr. Elliot as virtually the only means by which Canada may continue in her present position in the postwar era of scientific developments. The speaker made a concise survey of the present and future peacetime applications of atomic fission in the fields of chemistry, biology, and medicine, pointing out its value in the treatment of cancer and as a method for radioactive tracing of body functions. Dr. Elliot was introduced by E. D. Bent, chairman of the Rubber & Plastics Group, and thanked by W. E. Denmark, of the Paint club.

Silastic Discussed at Akron

THE Akron Rubber Group held a dinner-meeting at the Mayflower Hotel, Akron, O., on February 1. An attendance of 271 heard the speakers of the evening, W. W. Pederson and Philip Servais, of Dow Corning Corp. Mr. Pederson spoke on "Silicones—New Engineering Materials;" while Mr. Servais' topic was "Silastic—Silicone Rubber."

In his talk on Silastic, Mr. Servais reviewed the structure and formation of this silicone rubber. He pointed out that although silicone rubbers require higher temperatures and longer periods of time for vulcanization and cure than do organic synthetic rubbers, they have a saturated molecular structure, a fact contributing largely to their exceptional heat stability and oxidation resistance. Silicone rubber is able to resist, with only slight changes in its rubber-like properties, both high and low temperatures from minus 70° F. to over 500° F. To test accelerated oven aging of Silastic, temperatures of 300 to 480° F. are necessary, instead of the 160 to 250° F. temperature range used for organic rubbers. After 45 hours in a circulating air oven at a temperature of 480° F., Silastic shows a weight loss of 1.5 to 3%; hardness remains essentially constant; tensile strength slowly increases and then gradually decreases, and per cent. elongation shows a gradual decrease. Tests reveal that Silastic products can stand continuous exposure to temperatures of 300° F. and will withstand for some time temperatures over 500° F. All Silastic formulations decompose at flame temperatures, and although some will ignite with difficulty and continue to burn slowly, others do not burn.

Silastic contains no added plasticizers, yet remains flexible at temperatures as low as minus 70° F. even after exposure for as long as 24 hours. Some formulations can be subjected to even lower temperatures for short time periods and still remain flexible. Hardness is only slightly increased at temperatures down to minus 65° F. The data on heat stability of Silastic give an indication of its high order of oxidation resistance. Tests have also shown notable resistance to both ozone and ultra-violet radiation, as well as exceptional resistance to weathering.

Properly cured, Silastic adheres well to glass, ceramics, iron and steel, but adhesion to magnesium, brass, and aluminum is relatively weak. Silastic pastes adhere better than do the crepes, but cured pieces do not adhere to metals under service conditions. Water films will not form on the surface of a piece of silicone rubber because of its highly water repellent nature.

The tear resistance of silicone rubber is low compared to most other rubbers, but may be reenforced by other materials such as glass or asbestos cloth. Its low abrasion resistance makes Silastic unsuitable for use as tread stock.

The various Silastic stocks can produce a finished rubber with a durometer hardness of 40 to 85. Tensile strength varies from 400 to 700 p.s.i., and elongation varies from 75 to 300%. Resilience, as measured by a Bashore resiliometer, averages 52%. Flex life varies from 7,000 to a half-million cycles. Water absorption ranges from 7 to 47 mgms. per square inch after seven days at room temperature. A wide range of electrical properties is available for use in insulations; while chemical resistance is uniformly high.

Although almost entirely inorganic, Silastic stocks can be handled in most respects like compounded rubber and can be molded, extruded, laminated, or coated by adapting conventional processes and using standard equipment. The recognition of the limitations of Silastic at its present stage of development as a material for special-purpose applications, especially those involving temperature extremes, will prevent misuse of this material.

The paper presented by Mr. Servais on Silastic is valuable as an introduction to an article on the most recent developments with this material to be printed in an early issue of INDIA RUBBER WORLD.

Mr. Pederson's talk on the silicones gave a general introduction to their formation and structure, with slides showing the silicon and oxygen linkages in the molecules. The range of silicone products was reviewed, from the low-viscosity liquids through the solids such as Silastic. Silicones have proved to have successful commercial applications as bearing lubricants where high temperatures are encountered, as agents to prevent foaming of certain materials, as wire insulation for motors and generators operating at high temperatures, and as elastic materials in applications where flexibility and stability over a wide temperature range are required.

Smithers and Firestone Features of Los Angeles Group Meeting

THE Los Angeles Rubber Group, Inc., held its regular monthly meeting February 5 in the Hotel Mayfair, Los Angeles, Calif. More than 150 members and guests attended the technical meeting, with E. C. McLaughlin of The B. F. Goodrich Co., as presiding chairman. The speaker was V. L. Smithers, president of V. L. Smithers Laboratories, who spoke on "Vulcanization by High-Frequency Dielectric Heating as an Aid to Rubber Vulcanization." Illustrated with slides, the talk discussed development work in induction heating in order to increase production per mold and at the same time compete with results obtained by present methods.

Following the technical meeting was a cocktail hour and dinner-meeting under the sponsorship of the Firestone Tire & Rubber Co. and presided over by Curtis Wolter, Synthetic Division of United States Rubber Co., in the absence of the Group's chairman, C. M. Reinke. An attendance of 248 members and guests were greeted by Leonard K. Firestone and officers of his staff. R. E. Hutchinson, chief chemist for Firestone, introduced the other company guests present, including Clyde L. Smith, general factory manager; C. S. Osgood, Los Angeles district office; Robert Davis, western division sales manager; H. H. Wiedenmann, production superintendent; J. C. Ritchey, department manager of compound mixing division; E. E. Bevan, chief engineer; J. J. Robson, technical development department; L. M. Craig, department manager of material preparation; J. W. Elwood, manager of the technical division; H. H. McGregor, manager of mechanical division; N. T. Bruber, manager of tire building and curing department; J. C. Buchanan, production manager of finishing and final inspection; C. P. Connor, manager of warehouse and shipping department; R. A. Del Mar, manager of methods and standards department; E. C. Scott, manager of accessories and mechanical goods department; Phil Small, development tire building; Don Black, development tire curing; Arthur Borja, analytical laboratory; Clarence Leedom, purchasing agent; M. L. Paine, A. F. Reznicek, H. H. Hummer, and others.

Mr. Firestone in his remarks mentioned the difficulties experienced by rubber men during the war years and expressed confidence in the industry's ability to cope with the problems ahead. He introduced the speaker of the dinner meeting, Brownie Carslake, head of the Firestone racing department, who told stories of the Indianapolis speedway races and its heroes.

Besides the financial report of the Group, distribution of TLARGI's 1946 year-book was made at the business meeting. R. E. Hutchinson, the 1945 chairman, called special attention to the work of Curtis Wolter in coordinating the production of the annual publication, developed by a committee under the chairmanship of D. C. Maddy, and including R. L. Short, Leonard Boller, and C. H. Churchill. An added feature was the summary of the technical meetings, inaugurated last year under the direction of C. A. Neville, assisted by Carl Stentz, W. J. Thomas, Ray Stringfield, and P. W. Drew. These technical sessions, preceding the monthly meetings, are being continued under the direction of E. C. Laughlin, assisted by W. J. Thomas, Charles J. Roese, and H. L. Wiley.

The new year-book, in addition to the roster of members and a list of suppliers to the rubber industry, contains technical reference articles, charts and data, including "Permeability of Rubber to Gases," from U. S. Rubber; "Summary of Principal Plastics and Synthetic Rubbers" and "Status Report on Latex," by R. V. Yohe, of American Anode Co.; "Pounds per Square Yard of Sheet Rubber," by the R. T. Vanderbilt Co.; "Capacity of Hydraulic Rams in Tons"; "Alignment Chart for Tensile Strength of Rubber Compounds," reprinted from INDIA RUBBER WORLD; "Glossary of Compounding Materials;" and other material.

Rubber Film Shown at Ontario

THE Ontario Rubber Section, C.I.C., held a film night on January 24 at the University of Toronto. After a dinner at Hart House aproximately 100 persons viewed the 58-minute sound film, "Victory in Rubber," a pictorial record of the synthetic rubber industry, a recent release of the United States Office of Civilian Production Administration. The film, conceived by Bradley Dewey while acting as

Rubber Director, covers the construction of the synthetic rubber plants and the chemistry of the process from the raw materials through the various reactions to the finished product and illustrates the cooperative tire testing program at San Antonio, Tex., by the United States Army and the rubber industry. Other effects of the rubber program, such as the expansion of the carbon black industry, are briefly brought out. In addition to the feature film, various cartoons and short subjects were also presented.

Organizes Executive Committee

HENRY B. BRYANS, president of the American Standards Association, 70 E. 40th St., New York 17, N. Y., has announced the organization of an executive committee headed by Howard Coonley. The work of this new committee will have to do with the financial, administrative, and executive direction of the A.S.A. It will also make provision for meeting the increased responsibilities placed on the Association by the report to the Secretary of Commerce of a group of industrial executives headed by Charles E. Wilson, president of General Electric Co., which recommended that work on standardization be coordinated and promoted by the A.S.A. Serving with Mr. Coonley, a past president of the Association, on the executive committee will be Mr. Bryans, who is also executive vice president of Philadelphia Electric Co.; Frederick R. Lack, vice president of A.S.A. and of Western Electric Co.; Clarence L. Collens, chairman of the board of Reliance Electric & Engineering Co.; and George H. Taber, Jr., president of Sinclair Refining Co.

Plant Cleanliness[1]

THE Canadian Synthetic Rubber, Ltd., Sarnia, Ont., uses the following methods to achieve plant cleanliness and reduce accidents and injuries due to dirty or disorderly working conditions. Every individual, whether chief operator or learner, is required to clean up all untidiness he causes. This procedure applies also to shifts, which are required to leave their areas in good order before they go. To take care of maintenance workers a lost and found department was established to gather up and take care of tools and equipment left carelessly lying around. Each janitor on the staff has a specified area so that proper credit can be given for cleanliness. In addition each janitor is required to submit a daily report of spillage or unnecessary accumulation of waste and obsolete or rejected parts. Washrooms, in particular, are kept spotless in order to instill proper morale and standards of cleanliness in employes. This system has achieved very satisfactory results. In 1½ million man-hours' exposure the company had only four first-aid cases, none of which required medical aid or resulted in lost time.

[1]Abstracted from "Good Housekeeping in the Rubber Industry," R. J. MacDonald, "Annual News Letter," Rubber Section, National Safety Council, Nov., 1945.

First Connecticut Group Meeting Well Attended

THE newly organized Connecticut Rubber Group held its first meeting on February 15 at the Bridgeport Public Library, with approximately 165 in attendance. Speakers at the technical meeting were Everett G. Holt, rubber adviser to the Office of Domestic Commerce, Department of Commerce; Warren Lockwood, executive vice president of The Rubber Manufacturers' Association, Inc., and William Sparks, associate director of the chemical division, Esso Laboratories, Standard Oil Development Co., who spoke on "Synthetic Rubbers of the Future."

Holt on Rubber Outlook

Mr. Holt first reviewed the makeup of the Batt committee, which includes representatives of many government agencies. He pointed out that the influence of the military services on rubber thinking and policy making has increased since the end of the war and that the tinge of the committee is definitely security minded. With regard to the work of the Department of Commerce in compiling and disseminating reports on rubber, Mr. Holt stated that fully three-fourths of the foreign rubber reports are classified as secret or confidential and that no periodic compilations of reports are being released at present.

Speaking of rubber as a factor in international commerce, Mr. Holt stated that the volume of rubber in international commerce will be less in the postwar period than in the prewar period owing to several reasons, among which are the retention of synthetic rubber industries in this country and other countries, the growth of manufacturing facilities in rubber producing countries, the general impoverishment in Europe and Asia, and the ceiling prices placed on natural rubber by synthetic rubber. This country's share of world new rubber consumption eventually is expected to drop below 50% of the total, compared with more than 60% at present.

The consumption of rubber in the United States this year is expected to reach 900,000 tons, said Mr. Holt; while natural rubber receipts in all consuming nations are estimated at 625,000 tons in 1946. The maximum share of the U. S. in natural rubber receipts will be 300,000 tons, of which a maximum of 250,000 tons might be used up during the year. A minimum consumption of 650,000 tons of synthetic rubber in 1946 by this nation is therefore indicated, of which 100,000 tons will be special-purpose synthetics.

The expected overall natural rubber receipts of 625,000 tons can be broken down as follows: 175,000 tons from areas in production during the war; 250,000 tons existing stocks in liberated areas; and 200,000 tons from new production in liberated areas. Although areas in production during the war supplied 200,000 tons a year, the estimate of 175,000 tons is considered more likely as some natural rubbers were overexploited and areas overworked, and provision is made for increased use by producing countries. Of the 250,000-ton arrivals from existing stocks, estimates place 170,000 tons available in Indo-China, 95-100,000 tons in the Netherlands India, 65,000 tons in Malaya, and virtually nil elsewhere in the Indies. Indo China and Jave-Sumatra, both politically upset, have the largest stocks. Factors affecting arrivals from stocks are the difficulty of moving scattered stocks from the interior because of political disturbances, and the lack of transportation. Only about 100,000 tons of the estimated 250,000 have yet moved, with the remainder probable, but still uncertain.

The estimate of 200,000 tons from new production is based on several factors: trees are in good condition as the 10% loss was in young rubber; the native producing regions have labor available; and the need of money on the part of the producing countries makes them anxious to produce and sell. Unfavorable factors are: the political upheavals in Java, Sumatra, and Indo-China; lack of trade-stimulating goods, sales agencies, trading vessels, and difficulty of obtaining these from manufacturing countries; inadequate transportation; lack of plantation labor, as in Malaya where, in addition to the decrease in population during the Japanese occupation, 75-90% of available manpower is not in condition to work, and the food situation is desperate; the trend of trade interests in producing countries toward estates when concentration of effort on native output would get more rubber; and the recent price ceilings set on natural rubber which led some British estate producers to prophesy few sales of newly produced rubber before March 31.

If total synthetic consumption in the U. S. meets the estimated 650,000 tons, then 550,000 tons of GR-S will be needed in addition to the 100,000 tons of special-purpose synthetic. The capacity of petroleum-derived GR-S plants now operating is approximately 600,000 tons, a borderline figure that may necessitate reopening some of the alcohol-derived plants. Mr. Holt emphasized the need of avoiding undue buying of GR-S especially at this time to avoid straining of supply facilities.

Additional demand is placed on GR-S to replace reclaim in some applications as only 20-21,000 tons a month of reclaim are now being produced in comparison to fully 26,000 tons at the peak during the war. The reclaimers will be using constantly more synthetic scrap for at least three years, it is estimated, and future prospects for reclaim depend on success in reclaiming synthetic rubber and the continuing demands of consuming industries for the product.

Talks By Lockwood and Sparks

Mr. Lockwood, after reviewing some of Mr. Holt's work, discussed the difficulties in getting rubber from the Far East and stated that the bulk of rubber used in 1946, and probably also in 1947, would be synthetic. He decried the dependency on and overconfidence in the early return of natural rubber and forecast a large consumption of synthetic rubber. He underlined Mr. Holt's comments on production difficulties and, as an example, read parts of a letter from a plantation owner citing the damage to equipment and loss of labor. Mr. Lockwood also gave some experience encountered in a

(Continued on page 828)

Plastics Technology

Post-Forming Developments during the War and Their Applications to Peace-Time Products[1]

William I. Beach[2]

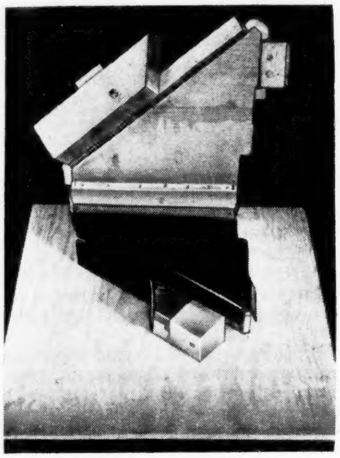


Fig. 1. An Example of a Book Die Used in Early Forming Development

POST-FORMING is similar in principle to other processes devoted to the art of molding, but differs in the treatment of material. Molding technique in all their various forms more or less fall into two distinct classes: namely, the molding of unprocessed materials into finished products and the forming or shaping of processed material from one plane or contour into a product having a different shape. Among the first are procedures for treating and molding resins, all forms of resin saturated fibrous mats, woven fabrics and paper by high-pressure or low-pressure methods. The second class deals essentially with the physical deformation of crystalline, amorphous, or a combination of amorphous and fibrous structure depending upon the nature of the material. To this group belong the hot or cold forming systems employed in the metal fabricating industries as well as those concerned with thermoplastic and thermosetting compounds.

[1] Presented before SPI Low-Pressure Industries Division Conference, Edgewater Beach Hotel, Chicago, Ill., Feb. 2.

[2] Henry J. Kaiser Co., Oakland, Calif.

Growth and Adaptation of Post-Forming to the Production of Aircraft

Although post-forming is categorically classified as low-pressure molding, it deviates from the conventional methods, largely in production technique. In practice, post-forming has much in common with many of the metal fabricating plants. As in metal forming, thermosetting laminated sheet stock is stretched and deformed by externally applied forces. Interchangeability of dies and tools from metal forming to plastic forming is frequently possible. However it is seldom practical to do so in view of the novel and unique die arrangements devised especially for post-forming.

This feature, which allows plastics to be formed with optimum speed and inexpensive tooling, is the direct outgrowth of the war effort to expedite the production of airplanes. At a time when material shortages were taxing the ingenuity of the aircraft plants to maintain the necessary flow of military airplanes to the war theater, stringent conservation measures were put into force. The necessity of casting about for replacement materials and ways and means for processing them led to the development of post-forming.

Recognition that plastics had possibilities for playing a small, but important part in the production of component parts came first. Means and ways for fabricating the material came second. Beginning in a modest way, small parts having post-formed sections with simple bends were experimentally injected into the flow of aircraft parts intended for the various sub-assembly jigs and final assembly lines. Eventually, when the novelty wore off, and such parts ceased to be subjected to more than the normal rough shop handling to satisfy native curiosity, more confidence was inspired and, subsequently, more progress made in the advancement of tooling and die design.

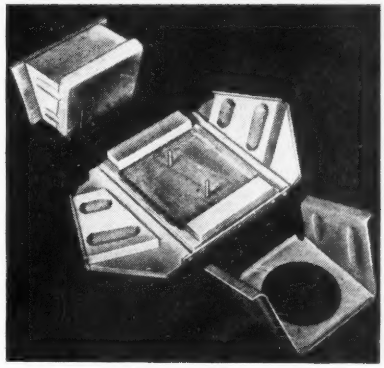


Fig. 2. Lamp Bracket and Plunger-Type Die

At the beginning even small parts having simple right-angle bends in more than one direction introduced considerable problems. This was solved by the construction of the book die, Figure 1, which is typical of the type of tooling used in the early stages of the forming development. For reasons of cost, ease of construction, and particularly to expedite tooling, wood was the principal material employed in these dies. The fact that tooling could be made inexpensively and rapidly did much to encourage further interest in post-forming.

From the conventional bending dies, the next step in tool design led to the forming of simple compound bends and curves. The lamp bracket shown in Figure 2 is representative of the caliber of work demanded for production. The plunger-type die shown in Figure 2 is one of the first to incorporate both hand and press operation. The force plug was attached to the ram of an arbor press. The sides were pushed up by hand and clamped in place with ordinary "C" clamps. Eventually this work was accomplished automatically and in less time through the use of pneumatic presses. Cams were devised to press the sides together when the plunger forced the spring loaded die downward to a stationary base. A plastic dome light bracket shown be-

Fig. 3. Console Part for Military Airplane and Forming Die

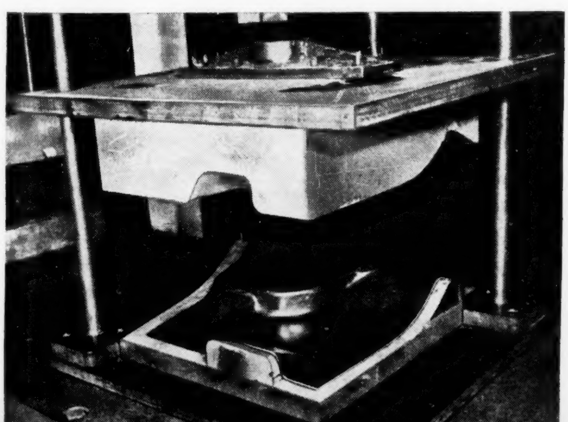


Fig. 4. First Step in Forming Bomber Upper Ball Turret Housing

side the die denotes beads and angles drawn and formed in one and the same operation.

Later, with advancement in both forming technique and production tooling, more complicated parts were possible. After wood had served well in experimental and temporary dies, more permanent ones consisting of kirksite, masonite, aluminum, laminated and cast plastics, or a combination of several of the above were found more durable and required less maintenance. Furthermore, with two- and three-stage dies designed to function automatically with air presses, some parts could be formed faster and at lower cost than comparable metal ones made with conventional metal working equipment. Such parts are represented by console assemblies found in the cockpit of some of the latest military airplanes. The complete assembly consisting of more than 15 individual components provides support for various instruments and tough, resilient panels for the walls. In addition to the optimum reduction of cost and weight expected of formed laminated items other benefits are derived: namely, electrical and thermal insulation, resistance to abrasion and corrosion, and reduction of motor noise transmission. In Figure 3 is shown a console part along with the forming die. The two base plates are fabric base laminated phenolic sheets. Upon the lower matching plate made of cast phenolic plastic rests the formed part. Directly above is the upper matching plate, which is also made of cast phenolic.

While improved technique and tooling were responsible for the forming of compound bends and curvatures, an equal amount of work was devoted to ways and means for obtaining deep drawn shapes. Attention is called to Figure 4, 5, and 6, which depict three steps in the drawing of the upper ball turret housing used on a bomber airplane. In Figure 4 the flat sheet or blank of ⅛-inch laminated material is held in place by the steel pressure plates. Above it, attached to the ram of an air cylinder, is a kirksite ball punch. The lower socket portion of the mold is also made from kirksite. Around the edges are fastened pressure cams which exert the necessary hold-down pressure and prevent lateral wrinkles developed as the material draws from extending down into the cavity of the formed part. Another view of the formed ball turret removed from the mold is shown in Figure 5. The size and shape is clearly defined in this view. In the last view, Figure 6, a direct comparison of a blank, drawn part, and part trimmed to finished dimensions is presented for study.

Adaptation of Post-Forming to Post-War Products

By and large, post-forming during the past emergency was engaged in furthering the war effort. Time did not permit much, if any, postwar experimentation. Consequently ventures in that direction as of this date have not been too plentiful. In a few instances some very remarkable work is being accomplished. But like the war period, when many subjects and products were necessarily restricted as confidential matter, now business acumen dictates the time and place for marketing and publication. Hence the post-war activities and possibilities must be discussed advisedly throughout the balance of this paper.

In the Northwest a processor of plastics saw the possibilities of a formed laminated plastic bread box to replace a plywood box then being used. The box in current use was approximately 20 by 32 by 6 inches deep and contained 24 loaves of bread. A formed plastic box made from 1/16-inch grade "C" laminated sheet was placed in service for observation. A survey taken over a given length of time disclosed the fact that although the laminated box cost $8 as against $4.50 for the plywood box, its ten miles shipping cost per year was $12 as compared to $27 for the other type. The saving is obvious.

An ingenious item now being produced in considerable quantity is a deep freeze unit manufactured in Los Angeles, Calif. Figure 7 shows several views of the formed plastic container. Designed to accompany the sportsman on fishing or hunting trips, this freeze unit has ample capacity and refrigerating life to transport game or fish hundreds of miles at a temperature well under 0° F. Oval in shape, the outside dimensions of the freezer are 24 by 18 by 18. The outside surface, reference Figure 7, consists of formed laminated sheet material. All hardware is metal. Inside, spaced about two inches from the outer wall, is an aluminum container nested in a layer of Fiberglas insulation. Attached to the top is a perforated box which holds standard dry ice bricks. The drop from normal room temperature to -50° F. is accomplished in one hour. With 50¢ worth of dry ice, the capacity of the storage box, the temperature within the container will stay below 0° F. for 48 hours. The advantages offered by this deep freeze container are several. The insulating properties of the laminate are superior to those of metal so that it is unnecessary to provide breakers between the interior and exterior shells. Furthermore the lid nests inside and is free to contact the metal, being an insulator itself. Lightness, resistance to denting and corrosion are other desirable features. In all, the deep freeze unit complete weighs 25 pounds. As far as is known, this is the only portable unit on the market that is designed for dry ice refrigeration.

One of the most promising applications for post-formed plastics is in the decorative field. Prior to World War II, decorative laminates were used to some considerable extent as wall paneling in hotels and public buildings, and more prolifically as surfacing for table and bar tops. However decorative sheet was usually restricted to flat surfaces. Cove bases and flanges, when used, were attached by chromium plated joining strips. Installation costs, plus the fact that some of the most attractive features of decorative patterns were frequently marred by attaching fixtures, was a disturbing factor.

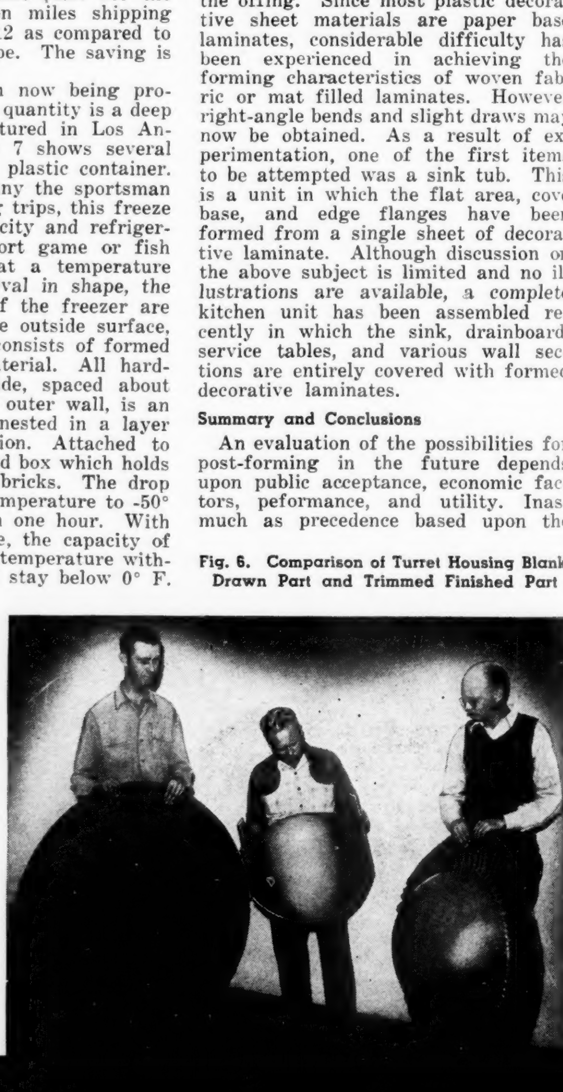
With the advent of formed decorative laminates, a newer and no doubt greater application of these materials is in the offing. Since most plastic decorative sheet materials are paper base laminates, considerable difficulty has been experienced in achieving the forming characteristics of woven fabric or mat filled laminates. However right-angle bends and slight draws may now be obtained. As a result of experimentation, one of the first items to be attempted was a sink tub. This is a unit in which the flat area, cove base, and edge flanges have been formed from a single sheet of decorative laminate. Although discussion on the above subject is limited and no illustrations are available, a complete kitchen unit has been assembled recently in which the sink, drainboard, service tables, and various wall sections are entirely covered with formed decorative laminates.

Summary and Conclusions

An evaluation of the possibilities for post-forming in the future depends upon public acceptance, economic factors, peformance, and utility. Inasmuch as precedence based upon the

Fig. 5. Turret Housing Removed from Mold after Forming

Fig. 6. Comparison of Turret Housing Blank, Drawn Part and Trimmed Finished Part



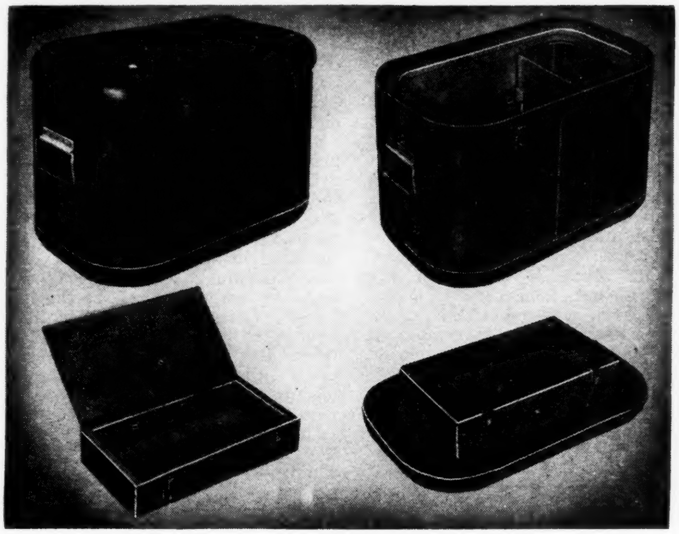


Fig. 7. New Formed Plastic Container for Deep Freeze Unit

above conditions is not sufficiently established to prognosticate the accomplishments of post-forming in the future, reservation of opinion or judgment is the best policy. However present trends in this work indicate that some important contributions to society may be forthcoming from post-forming activities.

The electrical industry consumes great quantities of laminated thermosetting sheet material in forms of power installations and household appliances. Already in many of these applications, formed plastics are being used or are in the process of planning.

The transportation field furnishes a likely prospect for formed plastics. No doubt worthwhile applications will be made in automobiles, buses, trailers, boats, and airplanes as a result of better strength-weight ratios and reduced costs of fabrication. For reasons already mentioned formed plastics in many applications should be adapted admirably to the home.

A prospect which has potential implications is the forming of low-pressure molding or laminated Fiberglas reenforced plastics. Recent successes indicate comparable formability to that of the fabric base products. With this development, structural materials are now available to post-forming.

Geon Plastic Latex

PLASTIC latex made with Geon polyvinyl resins adaptable for the impregnation or plain coating of thread, yarn, string, and wire has been announced by The B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O. Cords and threads of nylon, Fiberglas, silk, cotton, wool and rayon, as well as wire, have been successfully coated, and a variety of uses has been suggested, according to John R. Hoover, general sales manager of plastic materials.

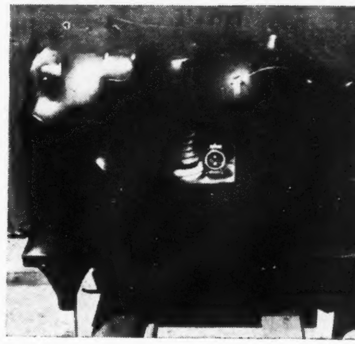
For stranded materials, a thin, even coat of Geon latex is applied to the thread or cord and heated, preferably in a tower having a graduated temperature range from 150 to 300° F. This method yields optimum physical properties; while fair properties can be attained with a uniform temperature of 200° F. The company has devised a tower apparatus employing this variable regulated temperature range and through which the material can be passed at a rate of 10 to 15 feet a minute, depending on the thickness of the coating.

Geon plastic latices contain uniform plastic particles, each particle with its own quota of resin and plasticizer, thus facilitating the formation of coherent uniform films and coatings. The resins are also supplied in water-dispersed form ready to plasticize; other ingredients may be added to the latices by the processor to obtain any necessary modifications. Textile fibers coated with Geon latex are grease, moisture, and abrasion resistant, are permeable when used in woven fabrics, and have greater durability than when uncoated. Applications include screening, woven upholstery fabrics, tarpaulins, fish lines, and thin walled insulation. The latices have also been used as coatings or impregnants for fabrics, paper, leather, and other materials.

Saran Spray Packaging

A SPRAY packaging technique using Saran films has been devised by Dow Chemical Co., Midland, Mich. This technique employs Saran F-122 latex and F-120 solvent-soluble resin films and can be applied to both large and small machinery and equipment.

After inserting suitable desiccant units, a machine, such as an air compressor, is taped to cover sharp edges or projections and to provide an openwork lattice for subsequent coating. Saran F-120 is then sprayed on the taped structure to produce an overall cobweb-like covering. Finally, a coating of F-122 latex is sprayed over the cobweb covering to provide a tough, waterproof, and dustproof finished package. If desired, one or more transparent windows for inspectional



Air Compressor with Saran Film Spray Packaging

purposes or for identification can be provided by cutting the cobweb coating and taping in a sheet of Saran before coating with the latex film. An air compressor given the spray packaging technique is shown in the accompanying illustration.

Plastics Research at M.I.T.

THE Plastic Materials Manufacturers Association, Inc., has announced the start of a long-range research program in plastics at the Massachusetts Institute of Technology, Cambridge, Mass. This work will be under the supervision of Prof. A. G. H. Dietz, of the Department of Building Engineering and Construction, who will be director of the project. Research will deal with the fundamental engineering properties of plastics and, if necessary, will set up new test methods, according to W. Stuart Landes, president of the P.M.M.A. Included in the research program will be studies of such factors as the effect of molecular structure upon the behavior of plastics; how the rate of loadings affects strength and ductility; behavior under long-term application of loading; behavior under repeated intermittent loading; the effect of various temperatures upon different plastics; and the effect of aging upon strength properties.

The decision to conduct research on fundamental engineering properties of plastics, explained Mr. Landes, was preceded by a twelve-month survey of the need of precise data. Of the various physical properties, the preliminary survey showed the mechanical properties to be most in need of study. The survey disclosed that electrical measurements are in a much better position than the mechanical and that existing information is generally satisfactory. It is the aim of the M.I.T. research to correlate physical properties with chemical composition, but none of the research will be aimed at the development of new plastics. Only plastics now in existence, or which become commercially available, will be studied, and the results of such research will be published in scientific journals, with data made available to industrial laboratories of participating companies while the research is in progress.

Representing the plastics association

on the steering committee for the project will be D. S. Frederick, vice president of Rohm & Haas Co., whose assistants will be Harold W. Paine, of E. I. du Pont de Nemours & Co., Inc.; John H. Adams, of Bakelite Corp.; W. C. Goggin, Dow Chemical Co.; Howard J. Nason, Monsanto Chemical Co.; and L. W. A. Meyer, Tennessee Eastman Corp.

Associated with Dr. Dietz on the M.I.T. plastics committee are E. A. Hauser, E. R. Schwarz, W. H. Stockmayer, and W. M. Murray. The association has named a test specimen committee composed of L. A. Sontag, of Durez Plastics & Chemicals, Inc.; W. A. Gloor, Hercules Powder Co.; and J. A. Murray, Plaskon Division, Libbey-Owens-Ford Glass Co. Robert Burns, of Bell Telephone Laboratories, will act as representative of the A.S.T.M. in an advisory capacity to the steering committee. As dean of engineering at M.I.T., Prof. Edward L. Moreland will have overall direction of the project.

"In addition to obtaining engineering information," Mr. Landes stated, "it is believed the program will develop trained personnel to work in plastics engineering. This would result from class instruction as well as laboratory investigation on the part of students and the research staff and eventually would accelerate progress within the industry."

Plans Marvinol Production

GLENN L. MARTIN, president of The Glenn L. Martin Co., Baltimore, Md., has announced that the company is ready to manufacture its new elastic plastic, Marvinol, and that the construction of a $1,500,000 plant has been authorized. This plant, which will be in production by next fall, will ultimately have an annual capacity of about 11,000,000 pounds of Marvinol-type polyvinyl resins and will be operated by the plastics and chemicals division of the company. The new plant will manufacture only the raw materials. Experiments in the company laboratories have shown the material to be suitable for such applications as multi-colored wire insulation, transparent garden hose, hospital sheeting, wristwatch straps, woven fabrics, meteorological balloons, tubings, serving trays, gloves, shoe heels, and many others.

Simultaneously Mr. Martin announced that the division has developed a new type of shoe soling, in one form much like leather soles, but far superior in wear resistance and completely impervious to water.

The Marvinol-type resins will vary from a rigid to a soft "rubbery" state. It was also revealed that a pilot plant, secretly operating in Cleveland, has been producing substantial quantities of these resins for the past two years. Plans for the immediate future call for manufacture only of the Marvinol resins to be marketed in a granular white powder form which will be sold only to fabricators and converters.

Also incorporated in the new division's activities will be a complete customer service laboratory entirely devoted to the development of new and unusual uses for Marvinol-type resins. This laboratory has already been established in Baltimore and fully staffed.

Already developed from Marvinol resins for use in new Martin Airliners are leather-like resin coated fabrics for wall and floor coverings and for upholstery. Other applications include insulation and terminal sleeves, gaskets, control knobs, and instrument covers. Laboratory experiments have produced a decorative and scuffproof finish from Marvinol resins for the newly developed honeycomb plastic-sandwich flooring in the Airliners. In early experiments with Marvinol, an inner tube for tires was developed which gave highly successful test results. This work was discontinued owing to material shortages, and there are no plans for resuming it at present.

Pyroxylin-Coated Fabrics and Paper

A TOTAL of 6.4 million pounds of pyroxylin was spread during October, 1945, an increase of 16 and 33% over the amounts spread during September and August, respectively, according to a recent report of the United States Bureau of the Census. Unfilled orders for pyroxylin-coated fabric materials at the end of October, 1945, amounted to 12 million yards, or 5% less than the 12.7 million yards on order at the end of September. Although "Light" cotton fabrics and "Heavy" cotton fabrics showed increases in unfilled orders, they were more than offset by the decrease in unfilled orders for "Custom" coating. Shipments of 7.9 million yards of pyroxylin-coated fabric materials during October were 29% greater than the 6.1 million yards shipped during September.

These data are based on reports of 29 companies reporting to the Bureau of the Census. The statistics presented represent operation of processors who coat of impregnate fabrics or paper with soluble cotton or pyroxylin preparation, either separately or in combination with other materials. "Light" cotton fabrics include sheetings and print cloths; "Heavy" cotton fabrics include drills, ducks, sateens, broken twills, and moleskins.

Silicones Discussed

THE Thiokol Technical Club held a regular dinner-meeting on January 23 on the premises of Thiokol Corp., Trenton, N. J., which was attended by 40 members and guests. Speaker of the evening was H. L. Boulton, of Dow-Corning Corp., whose topic was "Silicones—New Engineering Materials." In the course of his talk Mr. Boulton described the chemical nature of the silicones, briefly traced the history of their development, and described the various silicone products, including fluids, greases, compounds, resins, varnish, and rubbers, giving their basic properties and major applications. Slides and samples were shown to illustrate many of the preparations and products mentioned.

Connecticut Group

(Continued from page 824)

trip to the Far East as a member of the Tripartite Committee studying the rehabilitation of rubber producing areas.

In his talk Dr. Sparks stated that present production capacities and prices for existing commercial synthetic rubbers are such that only modifications of present types can be expected during the next few years, particularly in view of the lack of wartime stimulus. The newer types now under investigation reflect the importance of control of functionality and molecular structure, and trend away from the classical polydiolefin approach. Dr. Sparks reviewed discoveries within the past 15 years which disproved the belief that the polydiolefin structure was necessary for rubber-like behavior and vulcanizability, and the belief in the necessity of a large excess of double bonds (overfunctionality) for vulcanization. He pointed out the establishment of the principle of controlled marginal funtionality with the synthesis of Butyl rubber in 1937 and the evidence that German thought also had begun to follow this new line.

Business Meeting

Following the technical meeting, a short business meeting was held, with the tentative chairman, Roger Bascom, B. F. Goodrich Chemical Co., presiding. Preliminary plans call for two technical meetings and one summer social meeting of the group each year. A nominating committee was named to select candidates for regular officer elections. Members of the committee are: W. J. O'Brien, Seamless Rubber Co.; I. C. Eaton, General Electric Co.; Stewart Boyd, Naugatuck Footwear; Al Jennings, E. I. du Pont de Nemours & Co., Inc., Fairfield branch; Otto Lang, Armstrong Tire & Rubber Co.; G. C. Maasson, R. T. Vanderbilt Co.; George D'Olier, Raybestos-Manhattan, Inc.; Fred Conover, Naugatuck Chemical; and Mr. Bascom.

New Nevillac Plasticizer

NEVILLAC TS, a new plasticizing resin said to have very little odor and good color retention, has been placed on the market by The Neville Co., Pittsburgh 25, Pa. A clear amber, resinous oil with a vague phenol odor, Nevillac TS is very viscous and slow flowing. It is soluble in practically all solvents except water, glycerine, and higher polyhydric alcohols, and is miscible with ethylene glycol and its di-and tri-derivatives. Nevillac TS is also claimed to be compatible with zein, cellulose derivatives, synthetic rubbers, terpene, alkyd, phenolic, vinyl, and coumarone-indene resins.

This plasticizer has an average molecular weight of 250. The specific gravity at 30.0/15.6° C. is approximately 1.08. Refractive index at 25° C. is 1.599. Distillation is essentially above 300° C., with slow decomposition starting at about 370° C. Suggested uses for the new product are as a plasticizer, softener, impregnant, and for waterproof and greaseproof paper coatings.

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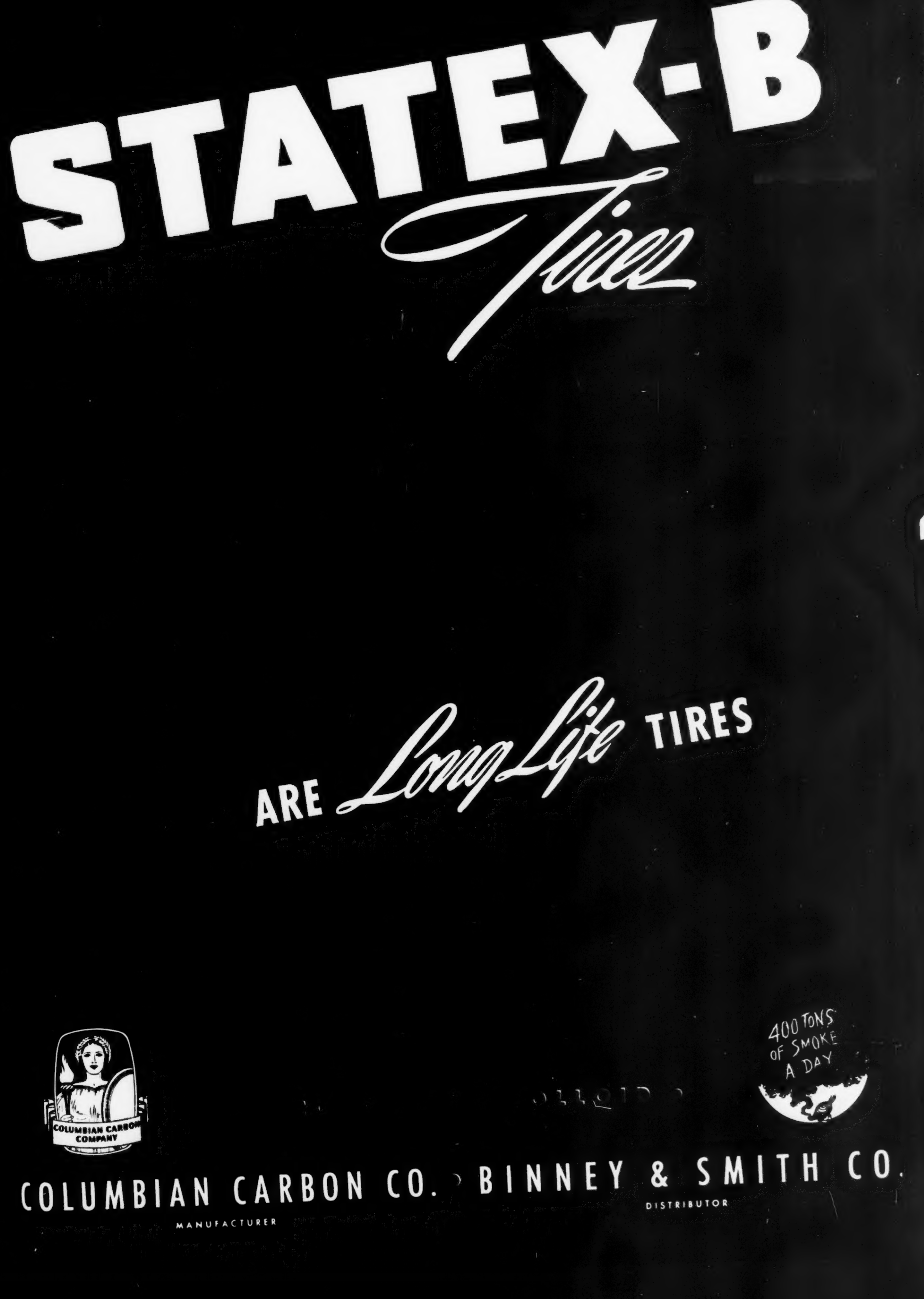
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RUBBER WORLD NEWS of the MONTH

Highlights—

The reaction of the U. S. industry to the 20¼¢-a-pound price for Far Eastern natural rubber was generally favorable; while some producers in the Far East indicated that a higher price would be necessary to defray rehabilitation and higher labor costs. Some of the aspects of future U. S. government and industry policy have become evident although the report of the Inter-Agency Policy Committee on Rubber is now not expected to be made public until the first part of March. Continued government control and operation of most of the synthetic rubber plants for several years is anticipated, and the required use of a certain amount of synthetic rubber even after natural rubber is available in unlimited quantities seems quite probable. In spite of continued material shortages, particularly in textiles, and the uncertain labor picture, earnings in the industry are expected to be at record levels during 1946. An increase in the price of textiles granted by the OPA on February 20 should improve the textile supply picture. A precedent-setting conference between management representatives of the Big Four rubber companies and the URWA (CIO) began in Washington on February 19. The union's seven-point wage-hour program was the major subject for discussion. Industry spokesman stated that in view of the government's wage-price policy as announced on February 15, any agreement for a wage increase would become official only after its approved by the new Wage Stabilization Board as a basis for price increases. Negotiations were concluded on March 2 with an agreement for a flat wage increase of 18½¢ an hour for all employes covered by the agreement.

Postwar Policy Takes Shape

With the announcement of an interim price of 20¼¢-a-pound, f.o.b. Far Eastern ports, for natural rubber by the State Department on January 28, the CPA announced plans for increasing the current ration of natural to GR-S synthetic rubber in industry products if receipts of natural rubber during the next several months live up to expectations. Although the much heralded report of the Inter-Agency Policy Committee on Rubber is now not expected to be made public until some time in March, independent actions by various government agencies and statements by industry spokesmen have given some indication of the probable future trends of government and industry policy. Natural rubber usage in the United States will not gain its prewar volume for some time to come. The industry will try to combat rising costs during the postwar period by stabilizing labor costs, modernizing equipment, increasing the diversification of its products, and seeking a reduction in the federal excise tax on tires and tubes. The recent price increase granted the textile industry by the OPA should do much to improve the tight fabric situation in the rubber industry.

The Natural Rubber Price and Supply Situation

The announcement by the State Department on January 28 of a price of 20¼¢ a pound for the purchase of natural rubber from British, Dutch, and French areas in the Far East was viewed with satisfaction by the rubber industry in this country as a contribution to price stability of both natural and synthetic rubbers, but it is understood that natural rubber producers in the Far East consider the price too low. Such a price, if maintained over a long period of time, is expected to contribute much to continued stability of the U. S. rubber industry. However, the agreement with the British expires on March 31, 1946, and with the Dutch and the French on June 30, 1946, and the price most likely will again be adjusted. It is very probable that the United States will seek to lower the price, but this action will meet with active opposition on the part of the producing countries. The British Government pays growers the equivalent of 16 9/10¢ a pound at collecting points, according to latest reports, and the difference between that and the 20¼¢ charged the United States is said to be the minimum for selecting, packing, and shipping rubber to the ports. Malayan planters say the 16 9/10¢ price is too low owing to increased production costs. In a protest made recently to the Colonial Secretary in London the planters state that it is impossible for them to pay labor costs and rehabilitate their estates. The Malayan planters are pressing the British Government to secure a revised agreement with the United States raising the price from the present 20¼¢, f.o.b. the Far Eastern ports, to 28 to 30¢ delivered in the United States. In general the attitude of the American rubber industry was summed up by one manufacturer, when he said:

"We will use imported natural rubber at a fair price—if it isn't fair we will use our own rubber."

With regard to the supply of natural rubber, it will be two years or more before American industry can return to unlimited use of the natural product because of the difficulty of restoring production in liberated areas, members of the Civilian Production Administration's Rubber Advisory Committee were told by W. James Sears, director of the CPA Rubber Division, at a meeting on February 1 in Washington. Mr. Sears stated that if receipts of natural rubber during the next six months bear out present estimates, it will be possible to more than double the current ratio of natural to GR-S synthetic rubber. He pointed out that this still would leave the industry far short of requirements for unlimited use since the percentage rise would only be from the present 10 to about 25% at the end of six months.

The nation began the year with an inventory of 125,000 tons of natural rubber. Present reconversion planning is based on receipt this year of some 300,000 tons from all sources, as now estimated. If the receipts on which the planning is based do not materialize, the rate of conversion might have to be slowed, it was pointed out.

The Committee discussed the tentative schedule for reconversion to wider use of natural rubber and recommended that a "conservative" national working inventory be maintained during the period while natural rubber is in short supply. Until more information is available on the amount of natural rubber that may be forthcoming as a result of new production in the Far East, the Committee recommended that an adequate inventory position be maintained which the Rubber Division believes should be about eight month's supply.

L. B. Proctor, vice president of the Rubber Development Corp., gave the following picture of the natural rubber situation in the Far East, based on the best information available to government agents in those countries:

INDO-CHINA. There was believed to have been 170,000 tons stored here at the end of the war, but at least 15,000 tons were sabotaged. The RDC is counting on no more than 150,000 tons in the next six months if labor and shipping can be secured to transport this rubber out of the country. New production for 1946 probably will not exceed 25,000 to 35,000 tons, which is about half of the prewar annual production.

MALAYA. Much of the rubber has come down from the up-country, and 50,000 to 60,000 tons of stock were recovered on reoccupation, of which a good proportion has been shipped to consuming areas. The labor force is dissipated, and it is doubtful if more than 30% of the prewar force can be rounded up. New production for the first quarter of 1946 is put as low as 15,000 tons, with 24,000 tons additional likely to be produced in the second quarter.

NETHERLANDS INDIA. Reports indicate between 80,000 and 90,000 tons available in stockpiles. There is no information on possibilities of new production.

Industry Advisory Committee members who attended this meeting were: Charles H. Baker, Charles H. Baker Co. (Goodyear Footwear Corp.); John L. Collyer, B. F. Goodrich Co.; Harvey S. Firestone, Jr., Firestone Tire & Rubber Co.; F. D. Hendrickson, American Hard Rubber Co.; Howard W. Jordan, Pennsylvania Rubber Co.; F. Thatcher Lane, Seamless Rubber Co.; P. W. Litchfield, Goodyear Tire & Rubber Co.; A. L. Freedlander, Dayton Rubber

Mfg. Co.; Jean H. Nesbit, U. S. Rubber Reclaiming Co.; William O'Neil, General Tire & Rubber Co.; Thomas Robbins, Jr., Hewitt Rubber Co.; J. P. Seiberling, Seiberling Rubber Co.; Herbert E. Smith, United States Rubber Co.; J. Newton Smith, Boston Woven Hose & Rubber Co.; F. F. Sommers, Rainfair, Inc.; James A. Walsh, Armstrong Rubber Co.; and Robert S. Landers, Landers Corp.

The Combined Rubber Committee

Formation of a Combined Rubber Committee, comprising representatives of the six major rubber producing and consuming countries, to continue allocation control over rubber supplies during the period of world shortage was announced on January 29 by George Tisdale, chairman and United States member of the group. The Committee will carry on allocation control previously maintained through the Combined Raw Materials Board and its Rubber Committee, but will function as an autonomous group. Member countries and their official representatives follow: Belgium, C. Duchateau, Belgian Economic Mission, Canada, G. C. Bateman, Department of Reconstruction & Supply; France, Jean Lageat, French Supply Council; Netherlands, E. C. Zimmerman, Commissioner for the Netherlands Indies; United Kingdom, Douglas Campbell, British Raw Materials Mission; United States, Mr. Tisdale, Bureau of International Supply, CPA.

Government Urged to Retain Synthetic Plants

William L. Batt, chairman of the OWMR Inter-Agency Policy Committee on Rubber, was present at the above-mentioned February 1 meeting of the CPA Rubber Industry Advisory Committee and received the latest information regarding the position of the rubber industry on the control or disposition of the U. S. owned synthetic rubber industry. Leaders of the rubber manufacturing industry recommended indefinite federal ownership of the synthetic rubber plants in the interests of national security and to control and stabilize the price of natural rubber from the Far East. To carry out the postwar security program the manufacturers told the CPA that at least 250,000 tons of synthetic rubber should be turned out annually. It was also recommended that facilities to produce another 350,000 tons should be retained in standby condition ready to be placed into operation on short notice.

If such a large amount of synthetic rubber is made for security and price stabilization reasons even when natural rubber is available in unlimited quantities, the manufacturers agreed that it must be used and used equitably by all members of the industry. Obviously, therefore, federal regulation of the synthetic rubber industry is required. Despite their inherent objections to the government staying in the synthetic rubber business, industry leaders are reconciled to the fact that neither they nor the federal government can abandon the $750,000,000 investment, it was reported. Since private capital hesitates to gamble on large-scale production of synthetic rubber unless it has pretty good assurance of a profitable market and since this may not be possible if the price of natural rubber drops to or below the present 18½¢ a pound price for synthetic, continued government control and operation seems the only solution.

Litchfield "Notes" on Rubber Policy

In the fifth of the series of "Notes on America's Rubber Industry", Mr. Litchfield on February 20 in a bulletin entitled "A National Policy for Rubber" also strongly advocated continued government ownership of the nation's GR-S synthetic rubber plants.

"The present position of the Government as owner of the facilities for the production of synthetic tire rubber (GR-S) does not place it in direct competition with privately owned business," Mr. Litchfield said. "So long as Government owns *all* of the GR-S plants, it is not directly competitive with private enterprise. Should the Government dispose of *some* of its plants to private owners and retain the others, however, we would immediately find Government in direct competition with private enterprise and thereby in conflict with fundamental American principles," he added.

Mr. Litchfield emphasized that two prime factors involved in establishing a national policy for synthetic rubber were the matter of national safety and the price to be placed on natural rubber. The restraining influence of our synthetic rubber plants on the price of natural rubber is more likely to be exerted if they continue under government ownership rather than under private ownership, it was said. Under private ownership the objective would be profit. Profitable operations could be more readily achieved for synthetic rubber if the price of the competing natural rubber were high rather than low. This point is especially true with the general rubber situation in such highly unsettled state as it is today. Two more years of government ownership of the synthetic rubber plants will save the American consumer many millions of dollars in the price he must pay for tires, Mr. Litchfield added.

The arbitrary fixing of a price on natural rubber of 5¢ a pound over the economically justified price would in a single year cost the American consumer of rubber products about $80,000,000. At such a rate of saving the original cost of the synthetic rubber plants would be compensated for in less than ten years, it was also stated.

Meanwhile the question of private *vs.* government ownership of these synthetic plants is not nearly so pressing as the need of a continuous supply of GR-S with which to meet the nation's tire needs. Developments within the next two years could conceivably alter our national viewpoint on the question. We are more likely to be right in the end if we continue government ownership of these plants until clarification of the rubber picture has progressed much farther than it has at this time, Mr. Litchfield concluded.

Batt Committee Report

The report of the Inter-Agency Committee on Rubber Policy which will recommend the national policy on synthetic rubber plant disposal, the establishment of rubber stockpiles, the encouragement of rubber research and development, our buying program for Far Eastern rubber, and on other important items is expected to be made public by OWMR Director Snyder during the first week in March. This report will recommend the type of action or legislation required by the President and Congress to insure a satisfactory national policy on rubber that will prevent this country from ever being caught without adequate supplies of this vital raw material.

Rubber Industry Appraisal 1946-1948

E. F. Hutton & Co., New York, in its "Fortnightly Market and Business Survey" for February 7 presented a very interesting discussion of the future of the rubber industry entitled "Rubber Industry — An Appraisal 1946-1948." Under the heading of "Important Statistical Data" sales, per cent. operating income of total sales, earnings per share, etc., are given for the period 1939 through 1945 with 1946 estimated, for six companies, Firestone, General, Goodrich, Goodyear, Lee, U. S. Rubber. Aside from this information and a discussion of the outlook for comparative earnings, many other comments found in this study are worth recording.

"It is now expected that the rubber industry will experience during 1946 the largest peacetime production in its history. This anticipated high level is predicted primarily on the backlog of deferred demand built up during the war years. However once this backlog is eliminated, a sharp drop in output seems likely. The strong competitive characteristics of the industry are likely to emerge again as individual companies pursue aggressive efforts to better their position. Some improvement in the longer range perspective is possible from anticipated stability for raw material prices due to synthetic production. Less working capital will be required as heavy inventories will not be necessary in view of the availability of synthetic rubber. The earnings of leading tire producers will show a considerable improvement for 1946, in spite of large reductions in sales volumes, as a result of the elimination of the excess profits tax and of the need for heavy charges for contingency reserves," according to the first paragraph of this study.

"While the current demand picture indicates a high level of activity running throughout 1947, it is likely, with the elimination of the backlog of deferred demand and greater reliance upon the original equipment market, that the inherent competitive factors in the industry will become more pronounced . . . Heavy demands for non-tire products exist also, but when the backlog of consumers' deferred purchases and inventory requirements has been met, a substantial reduction in output may also be expected. Markets for non-tire products are less cyclical than for the tire industry, and a much greater expansion for non-tire porducts is anticipated by the industry. This expansion is unlikely to occur at a rate during the next several years which will offset the current inflated production rate due to deferred demands.

"Approximately two-thirds of the cost of a tire is rubber. Wages and salaries account for about 25%. During the war years costs were increased for a number of reasons: longer processing time for synthetic rubber, a loss

of skilled labor to the Army, production of larger tire and tube sizes, loss of efficiency due to longer hours, production of new products, and a sharp increase in hourly wage rates and average weekly earnings since 1941.

"Apart from the question of prices, labor problems constitute the greatest uncertainty for the industry. (Wholesale tire and tube prices increased 20.7% from August, 1939, to November, 1945. The current ceiling prices were established in May, 1942.) There is considerable agitation on the part of unions for a six-hour day. Labor strikes can, of course, seriously restrict operations. Even though there are no interruptions from this source, there is a lack of skilled labor which probably will be more determinant of maximum operations than either raw materials or plant equipment.

"The industry is attempting to meet this source of rising costs in two ways: one, through higher productivity as a result of the installation of new equipment and processes; two, through decentralization of plants."

Based on an expected production of goods during 1946 with a value of $1.5 billion, earnings for this year should be at record levels, substantially above those for the war years, this report states.

"Increased costs will reduce profit margins from the high point reached during the last few years. However, they should remain at satisfactory levels unless the industry is forced to accept higher costs without compensating price increases. Some economies have been achieved through the reduction of fixed charges and through increased productivity stemming principally from improved methods and the accumulative effect of many minor technological changes. Earnings will be improved over those of the war years in spite of lower sales volume primarily because of the elimination of the excess profits taxes and smaller charge-offs to reserves."

Excise Tax Reduction Desired

Along this same line of the trend of industry thinking and activities for the future, it is understood that The Rubber Manufacturers Association, Inc., plans to present a brief to the Internal Revenue Bureau of the Treasury Department requesting a reduction of the excise tax on tires and tubes. A bill has been introduced in Congress that would reduce after June 30 the federal excise tax on luxury items such as furs, jewelry, cosmetics, and liquor, and the industry is taking the position that if a tax reduction is to be granted here, there is an even greater reason why the tax on such necessities as tires and tubes should also be reduced. The federal levy is about 10-11% of the manufacturer's selling price to the retailer as compared with the 5% levy on trucks and automobile parts and accessories and a 7% tax on passenger cars and motorcycles.

Unfortunately the industry may have difficulty in obtaining a reduction of this excise tax on tires and tubes because of the fact that the Internal Revenue Bureau can collect with this tax about $100,000,000 a year from about 25 tire manufacturers as compared with the necessity of collecting the luxury tax from hundreds and thousands of retailers. The tax on a popular size 6.00x16 tire at the present time is $1.17 and on the tube is 28¢. The bigger the tire or tube, the greater the tax.

Textile Price Increase Granted

The announcement by the OPA on February 20 of a general price increase for the cotton textile industry was another important development expected to remove what had become almost the No. 1 bottleneck holding back tire and mechanical goods production in the rubber industry. The government program provides a general price increase to the cotton textile industry in recognition of recent increases in the parity price of raw cotton and of approved wage boosts granted by many mills. The scale of increases for various grades of textiles is now being worked out. On an average, it will mean an additional 3½¢ a pound to the mill or about a penny a yard.

As a further lever to get mills back into production of fabrics for such things as mechanical and other rubber goods, as well as for tires, CPA will require looms which have been engaged in the production of these essential fabrics during the past five years and which are now engaged in turning out less needed material, to resume the manufacture of the more important types of fabrics. These are the types of fabrics on which a flat 5% incentive bonus is being granted.

WAC Plant Disposals

An aircraft piston-ring factory, operated by the Perfect Circle Co. at Richmond, Ind., is to be sold, subject to the priority right of federal government agencies, to Firestone for $1,715,-650, War Assets Corp. announced February 8. The sale covers only land and buildings, the latter having a total floor area of 270,469 square feet. The Firestone company has announced that the postwar use of the project will cover the processing of plastic and rubber materials, with 1,500 persons employed. Perfect Circle Co. will spend $506,000 for the purchase of WAC-owned equipment now in the Richmond plant. All mechanical units not put to use by Perfect Circle will be removed by the WAC at government expense, it was stated.

Two partially completed buildings at Norwalk, Conn., which were to have been used by the Norwalk Tire & Rubber Co. in the manufacture of tires, together with a considerable quantity of construction material for their completion, were announced as being for sale or lease, by WAC on February 8. The plant site area is approximately 20,000 square feet, and the main building, a four-story structure with basement, is 70% complete. The office building is 40% complete. On February 11 it was announced that Norwalk Tire had completed negotiations for the purchase of this property and was immediately undertaking completion of the project. Under terms of the sale Norwalk will pay the government approximately $519,000 for the property and the work done to date. John W. Whitehead, president of the Norwalk company, stated that it will cost about $100,000 to complete the project, and he expressed hope that the job may be finished in about 30 days. Mr. Whitehead said that about 300 new employes will be taken on when the plant is finished and equipped.

A plant at Sycamore, Ill., operated by the Anaconda Wire & Cable Co. and readily adaptable for the commercial production of communication wire, was announced as available for sale or lease by WAC on January 30. This plant has an estimated capacity of 6,500 miles of field telephone wire a month. The property has eight buildings with 20 sections, two buildings of which are new, on a tract of slightly less than 3¼ acres. Production equipment on the premises is limited to braiders, stranders, spindle winders, aging units, butt welders, and similar items. There are no machine, sheet, metal or metal forming tools.

OPA's Drive against Used Tire Violations

Millions of potential death-trap tires for motorists have been removed from the market through the Office of Price Administration's nationwide drive to protect motorists from both inflated prices and unsafe casings, OPA announced February 4. More than 300 violations, many involving carloads or truckloads of casings, have been uncovered in a campaign launched last fall and still under way. More than a hundred treble damage suits, 144 injunctions, and ten criminal cases have already been filed as a direct result of OPA's campaign. Many of these cases have involved wholesale sales of "gyp-o" processed tires, which last fall flooded many markets particularly the metropolitan areas of California, Illinois, Massachusetts, Michigan, New York, and Ohio.

Tire dealers have been accustomed to selling worn and broken casings to junk dealers at scrap rubber prices, OPA said. This practice has continued, but some of these junkmen have been selling the casings at a good profit to disreputable recappers who have made token repairs and recapped the tires despite the fact that the casings were unsafe for use. The drive revealed that junk tires with OPA ceilings as low as 15¢ have been sold as sound used tires or recaps for as much as $10.50.

The National Association of Independent Tire Dealers, Inc., and its members were praised by OPA officials for sponsoring an extensive educational campaign to combat this death on wheels. Reliable dealers, the agency said, are reducing the accident toll greatly by checking used tires carefully to assure that all defects in usable tires are properly repaired before the tires are sold and that casings unfit for repairs are used only as scrap rubber. The recapping of scrap tires will remain a dangerous racket as long as the tire supply continues to lag behind demand, the OPA pointed out.

RMA Report on 1945 Tire Production

According to estimates released by RMA, the tire manufacturing industry produced approximately one tire for every automobile on the road in 1945. Production of passenger-car tires totaled 28,147,538. While this exceeded the war-restricted quotas established early in 1945, output fell far short of meeting long pent-up civilian demand, it was said.

A. L. Viles, Association president, noted, however, that rapidly accelerating production in the closing months

of 1945 and steadily increasing production since the first of the year had carried current weekly output to an all-time record high by the middle of February.

"Textiles used in the tire trade are still critically short, but barring interruptions resulting from these shortages or other causes, there is every indication that the industry will attain its 1946 goal of 66 million passenger-car tires," Mr. Viles said.

"Thus by early 1941, the accumulated backlog of tire demand should be nearly satisfied. At present, tires are being snapped up as rapidly as they reach dealers' shelves, and it will require at least a year to place working inventory stocks in normal balance."

With the Armed Services taking millions of casings, 1945 truck and bus tire production far outstripped 1941 output. The estimate showed 16,346,411 units produced in 1945; 11,148,278 units in 1941.

As in the case of passenger-car tires, chief uncertainty in the truck and bus tire production picture is the textile shortage. While passenger-car tires give high performance when built entirely with synthetic rubber, truck- and bus-size casings still require a proportion of natural rubber in their construction for optimum service in the larger sizes. Thus the unsettled conditions of the Far Eastern producing areas may have a bearing on production of tires in larger sizes, at least to the extent that conditions in Sumatra and Java, principally, are still limiting shipments of plantation rubber, Mr. Viles pointed out.

The estimates on 1945 production also covered passenger, truck, and bus tubes. The year's production totaled 41,101,866 units, compared with 57,432,767 units in 1941. Manufacturers' inventories were 3,670,544 units on January 1, 1946, the date at which the industry was permitted generally to use Butyl rubber, the new synthetic tube stock. With this American-made synthetic rubber in adequate supply, virtually all tubes manufactured in 1946 will be made of Butyl in light of its proven superiority for this purpose to any other known basic raw materials, the Association spokesman explained.

The detailed report on the 1945 production of automotive pneumatic casings and tubes is given in the following table:

CPA Consulting Technical Committees

Five new consulting technical committees have been formed since V-J Day, making a total of 22 such groups which will assist the CPA Rubber Division in charting the steps to be taken to provide the rubber manufacturing industry with increased amounts of natural rubber, the agency announced late in January. Pointing out that only about 500 tons of natural rubber from the liberated areas of the Far East had become available to industry in the United States since the war ended, Mr. Sears said that these committees would render invaluable service in helping to decide where and when natural rubber could be used during the period when supplies will remain short.

The new consulting technical committees are those for chemically blown sponge, foamed latex products, rubber band, rubber thread, and rubber toy manufacturers. None were allowed natural rubber during the war. The other 17 committees were appointed by the Office of Rubber Director and the WPB Rubber Bureau.

"The advice given to the various government rubber organizations by the leading technical men of the rubber manufacturing industry has been invaluable," Mr. Sears said. "Without it, certain phases of the work would have been most difficult if not impossible to accomplish.

"This technical assistance made possible the conversion from natural to synthetic rubbers in orderly fashion. In 1940 only 1% of all rubber consumed—not including reclaim—in the United States was synthetic. But by the middle of 1945 consumption of synthetic rubber had increased to 87% of the total consumed.

"Now we are planning a reversed procedure. When additional amounts of natural rubber are allocated to the United States and arrive in the country, it will be possible to permit the use of larger percentages in rubber products. It will be necessary to allot increases in usage first to the items that require natural rubber for improvement in quality, and here the advice of the technical consulting committees will be sought. We have been assured that they will continue to advise the Rubber Division during this period of reconversion as they did during the war."

The Reconstruction Finance Corp. has announced that about 8,000 tons of natural rubber from the liberated areas of the Far East have been received in New York, N. Y., since the war ended, Mr. Sears said, but it is stored in bond and will be available to American industry only when and if it is released by the Combined Rubber Committee. This, of course, does not include the 500 tons mentioned above that have already been added to the country's available supplies of natural rubber.

The membership of rubber industry technical consulting committees is as follows:

BRAKE LINING. H. F. Groendyk, chairman, Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J.; W. Dodge, Ferodo & Asbestos, Inc., New Brunswick, N. J.; William Nanfeldt, Firestone Industrial Products Co., Inc., New Castle, Ind.; C. A. Schell, Thermoid Rubber Co., Trenton, N. J.; Edward Wells, Johns-Manville Corp., New York; R. E. Spokes, American Brakeblok Division, American Brake Shoe Co., Detroit, Mich.

CHEMICALLY BLOWN SPONGE. J. F. McWhorter, chairman, Ohio Rubber Co., Willoughby, O.; George Sprague, Sponge Rubber Products, Derby, Conn.; U. H. Parker, Dryden Rubber Co., Keokuk, Iowa; H. S. Liddick, Davidson Rubber Co., Boston, Mass.; Marcus Orr, B. F. Goodrich, Akron, O.; Stanton Glover, U. S. Rubber, Naugatuck, Conn.

FOAMED LATEX PRODUCTS. J. J. Allen, chairman, Firestone Rubber & Latex Products Co., Fall River, Mass.; W. M. Reid, Dunlop Tire & Rubber Corp., Buffalo, N. Y.; M. Berman, Hewitt Rubber Corp., Buffalo; E. C. Svendsen, U. S. Rubber, Mishawaka, Ind.; Marcus Orr; C. H. Barnes, Goodyear Tire & Rubber Co., Akron.

GAS MASK. H. A. Winkelmann, chairman, Dryden Rubber, Chicago, Ill.; E. A. Norris, Acushnet Process Co., New Bedford, Mass.; G. M. McClelland, Continental Rubber Co., Erie, Pa.; M. J. Sanger, General Tire & Rubber Co., Wabash, Ind.; R. W. McGahey, B. F. Goodrich; H. N. Jackson, U. S. Rubber, Passaic, N. J.; S. C. Nicol, Goodyear; H. A. Anderson, Mine Safety Appliances Co., Pittsburgh, Pa.; John A. MacKay, Sun Rubber Co., Barberton, O.; W. S. Chinery, Industrial

ESTIMATED AUTOMOTIVE PNEUMATIC CASING AND TUBE SHIPMENTS — PRODUCTION AND INVENTORY — DECEMBER, 1945, YEARS 1945 AND 1941

	Original Equipment	Replacement		Export	Total Shipments	Production During Month	Inventory End of Month
		War Orders	Civilian				
Passenger Casings							
December, 1945	229,497	1,015	3,183,431	28,834	3,442,777	3,791,605	
November, 1945	341,536	1,466	3,113,702	24,864	3,481,568	3,683,522	1,837,516
Year 1945	1,116,158	124,798	25,350,723	212,518	26,804,197	28,147,538	2,151,539
Year 1941	19,855,693		34,117,268	586,423	54,560,384	50,391,918	3,165,132
Truck and Bus Casings							
December, 1945	148,490	6,946	662,143	36,564	854,143	1,026,252	
November, 1945	294,396	6.579	666,856	33,050	1,000,881	989,695	677,014
Year 1945	4,866,521	4,596,380	6,441,150	285,691	16,189,742	16,346,411	851,106
Year 1941	4,924,615		5,776,145	902,790	11,603,550	11,148,278	1,270,933
Total Casings							
December, 1945	377,987	7,961	3,845,574	65,398	4,296,920	4,817,857	
November, 1945	635,932	8,045	3,780,558	57,914	4,482,449	4,673,217	2,514,530
Year 1945	5,982,679	4,721,178	31,791,873	498,209	42,993,939	44,493,949	3,002,645
Year 1941	24,780,308		39,894,413	1,489,213	66,163,934	61,540,196	4,436,065
Passenger, Truck and Bus Tubes							
December, 1945	390,450	20.960	3,168,097	56,195	3,635,702	3,958,851	
November, 1945	667,279	10,608	3,297,643	47,068	4,022,599	4,245,000	3,387,251
Year 1945	6,118,575	4,632,855	28,528,249	408,179	39,687,858	41,101,866	3,670,544
Year 1941	24,721,558		38,749,308	1,232,097	59,702,963	57,432,767	4,685,904

Rubber Goods Co., St. Joseph, Mich.; G. A. Kanavel, Vulcanized Rubber Co., Morrisville, Pa.

GRINDING WHEEL MFRS. J. N. Kuzmick, chairman, Manhattan Rubber; N. V. Allison, Allison Co., Bridgeport, Conn.; C. E. Drake, U. S. Rubber, New York; F. G. Burk, A. P. deSanno & Sons, Inc., Phoenixville, Pa.; C. J. Waterman, Bancroft-Hickey Mfg. Co., Bristol, Pa.; H. C. Martin, Carborundum Co., Niagara Falls, N. Y.

HARD RUBBER. D. E. Jones, chairman, American Hard Rubber Co., Butler, N. J.; F. S. Malm, Bell Telephone Laboratories, Murray Hill, N. J.; H. J. Flikkie, B. F. Goodrich, H. E. Case, Luzerne Rubber Co., Trenton; E. R. Kellehey, Richardson Co., Melrose Park, Ill.; E. R. Laning, Joseph Stokes Rubber Co., Trenton; C. P. Morgan, Vulcanized Rubber.

INDUSTRIAL PRESSURE-SENSITIVE TAPE. V. N. Morris, chairman, Industrial Tape Corp., New Brunswick, N. J.; P. F. Ziegler, Bauer & Black, Chicago; H. J. Tierney, Minnesota Mining & Mfg. Co., St. Paul, Minn.; A. R. Gow, Seamless Rubber Co., New Haven, Conn.; C. E. Frick, Van Cleef Bros., Chicago.

INSULATED WIRE AND CABLE. R. A. Schatzel, chairman, Rome Cable Corp., Rome, N. Y.; E. D. Youmans, Okonite Co., Passaic; S. J. Rosch, Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y.; A. R. Kemp, Bell Labs; A. D. Cummings, Collyer Insulated Wire Co., Pawtucket, R. I.; J. T. Blake, Simplex Wire & Cable Co., Cambridge, Mass.; John Ingmanson, Whitney Blake Co., New Haven.

JAR RING. F. W. Frerichs, chairman, Cupples Co., St. Louis, Mo.; Harold Anderson, Ball Bros., Muncie, Ind.; C. C. Davis, Boston Woven Hose & Rubber Co., Boston; L. J. DeHolizer, Crown Cork & Seal Co., Baltimore, Md.; L. J. Howell, Hamilton Rubber Mfg. Co., Trenton; G. P. Mooshegranz, Jenkins Bros., Bridgeport; A. R. Brandt, Schacht Rubber Mfg. Co., Huntington, Ind.; R. D. Gartrell, U. S. Rubber; E. A. Schwartz, Crunden Martin Mfg. Co., St. Louis.

MECHANICAL RUBBER GOODS. W. L. Smith, chairman, Goodrich; W. W. Sanders, Boston Woven Hose; N. R. Karrer, Electric Hose & Rubber Co., Wilmington, Del.; F. C. Thorn, Garlock Packing Co., Palmyra, N. Y.; D. F. Harpfer, Goodyear; L. J. Howell, Hamilton Rubber; M. Berman; W. L. White, Raybestos-Manhattan, Passaic; C. H. Zieme, Republic Rubber Co., Youngstown, O.; C. J. Wyrough, Whitehead Bros. Rubber Co., Trenton; M. J. Sanger; Harry L. Ebert, Firestone, Akron, O.; J. F. McWhorter.

MEDICAL & SURGICAL RUBBER GOODS. Arthur R. Gow, chairman; H. S. Liddick; Ezra L. Hanna, Davol Rubber Co., Providence, R. I.; A. E. Hosier, Faultless Rubber Co., Ashland, O.; R. J. Limbert, Lee Rubber & Tire Corp., Conshohocken, Pa.; C. R. Porthouse, Pyramid Rubber Co., Ravenna, O.; Elmer Brueggeman, Seiberling Latex Products Co., Barberton, O.; George Lenhart, Wilson Rubber Co., Canton, O.; S. I. Strickhauser, U. S. Rubber, Providence; M. O. Orr, B. F. Goodrich.

PROTECTIVE CLOTHING. Dale Lovell, chairman, U. S. Rubber, Mishawaka; Harry Dannenbaum, Aldan Rubber Co., Philadelphia, Pa.; Charles Denni-son, Archer Rubber Co., Milford, Mass.; Hewitt MacPherson, Cambridge Rubber Co., Cambridge, Mass.; G. R. Spangenberg, Chicago Rubber Clothing Co., Racine, Wis.; A. F. Schildhauer, E. I. du Pont de Nemours & Co., Inc., Fairfield, Conn.; John W. F. Young, Federal Leather Co., Belleville, N. J.; Joseph L. Haas, Hodgman Rubber Co., Framingham, Mass.; R. R. Lewis, Vulcan Proofing Co., Brooklyn, N. Y.; M. O. Orr.

RUBBER BAND. Marcus Orr, chairman; C. W. Howlett, Hodgman; Garrett Roberts, Weldon Roberts Rubber Co., Newark, N. J.

RUBBER FOOTWEAR. Charles H. Baker, chairman, Chas. H. Baker, Inc., Providence; A. H. Wechsler, Converse Rubber Co., Malden, Mass.; Henry A. Stuart, Goodyear Footwear Corp., Providence; H. W. Martin, Hood Rubber Co., Watertown, Mass.; J. H. Kelly, Tyer Rubber Co., Andover, Mass.; V. N. Hastings, U. S. Rubber, Naugatuck, Conn.

RUBBER MOUNTINGS, SHOCK ABSORBERS AND DAMPERS. John D. Morron, chairman, and R. C. Knapp, both of U. S. Rubber, Detroit; Harry L. Ebert; M. J. Sanger; H. H. Fink, B. F. Goodrich; H. E. Wening, Inland Mfg. Division, General Motors Corp., Dayton, O.; J. F. McWhorter; R. C. Henshaw, Lord Mfg. Co., Erie; E. G. Kimmich, Goodyear; Sherman R. Doner, Manhattan Rubber.

RUBBER THREAD. W. L. Smith, chairman; H. E. Elden (alternate: W. M. Reid), Dunlop; G. R. Keltie, American Wringer Co., Inc., Woonsocket, R. I.; J. T. Brogden, Carr Mfg. Co., Bristol, R. I.; J. J. Allen, Firestone Rubber & Latex; H. E. Cooper, U. S. Rubber, Providence; R. L. Cragan, Lloyd Mfg. Co., Apponaug, R. I.

RUBBER TOYS. John MacKay, chairman; Elmer Brueggeman; Marcus Orr; P. H. Watkins, Eagle Rubber Co., Ashland; John Shira, Oak Rubber Co., Ravenna; Leonard Mohselder, Barr Rubber Products Co., Sandusky, O.; H. W. Gill, National Latex Products Co., Ashland.

SOLES AND HEELS. W. E. Kavenagh, chairman, Goodyear, Windsor, Vt.; R. W. Lowe, Endicott-Johnson, Johnson City, N. Y.; R. E. Hughes, International Shoe Co., Hannibal, Mo.; L. F. Leatherman, Lima Cord Sole & Heel Co., Lima, O.; Arthur Ross, Panther-Panco Rubber Co., Stoughton, Mass.; C. F. Hoover, Essex Rubber Co., Trenton; W. F. Ridge, U. S. Rubber, Providence; Allen O'Neal, B. F. Goodrich, Clarksville, Tenn.

DENTAL RUBBER MANUFACTURERS. W. P. Keith, chairman, Hygienic Dental Rubber Co., Akron; R. B. Savin and T. A. Swartz, both of S. S. White Dental Mfg. Co., Philadelphia; S. D. Milroy and G. P. Wannemacher, both of Claudius Ash Sons & Co., Irvington, N. J.; W. L. Tepper, Martin Rubber Co., Long Branch, N. J.; Hobart Corning, Corning Rubber Co., Inc., Brooklyn; R. H. Mercer and G. A. Lilly, both of American Dental Trade Association, Washington, D. C.; R. W. Fuller, E. J. McCormick Rubber Co., Ridgefield Park, N. J.

SURGICAL ADHESIVE TAPE. P. F. Ziegler, chairman; John Clark, Bay Division (Parke-Davis), Canton, O.; David Smith, Johnson & Johnson, New Brunswick, N. J.; Arthur R. Gow.

TIRE AND TUBE. H. E. Elden, chairman; H. J. Niemeyer, Firestone; H. B. Pushee, General Tire, Akron; W. H. Denton, B. F. Goodrich; J. E. McCarty, Goodyear; H. P. Partenheimer, Mansfield Tire & Rubber Co., Mansfield, O.; W. F. Hoelzer, Pennsylvania Rubber Co., Jeannette, Pa.; E. H. Gibbs, Seiberling Rubber Co., Akron; L. B. Martin, U. S. Rubber, Detroit; R. Brasaemle, Lee; A. H. Nellen, Rubber Reserve Co., Washington.

TIRE AND TUBE REPAIR MATERIALS. T. E. Boyle, chairman, B. F. Goodrich; B. C. Eberhard, Goodyear; H. F. Webster, Denman Tire & Rubber Co., Warren, O.; F. C. Theiss, General Tire, Akron; R. J. Bonstein, Firestone; N. E. Ries, Mohawk Tire & Rubber Co., Akron; D. A. MacDonald, U. S. Rubber, Indianapolis, Ind.; L. L. Fortune, Fremont Rubber Co., Fremont, O.

Rubber Use Eased

Improved quality of certain tires, including logger tires needed for the production of lumber, will be obtained as the result of changes in R-1, announced recently by the Civilian Production Administration.

Better rubber footwear and more of it also will be made available. While increasing the amount of natural rubber that could be used in certain products, CPA also permitted use of restricted amounts of the natural product in 100 items for which it had been barred during the war. Among them are boots, arctics, gaiters, rubbers, and canvas rubber-soled shoes.

Also affected are such office supplies as rubber bands and pencil erasers. During the war rubber bands were made without any natural rubber. They now may be manufactured with 37½% natural; while the amount permitted in erasers has been increased slightly.

These changes comprise the first step taken by CPA's Rubber Division to improve the quality of many products and at the same time overcome production difficulties. They were effected by reissuance of Rubber Order R-1, including Appendix I, and the reissuance of Appendix II. The order last was amended last year by the WPB.

"We believe the step taken today is conservative as it involves only 2,000 tons monthly", said W. James Sears, director of the Rubber Division, in announcing the changes. "Of the tonnage, about 1,435 will go into tires and the remainder to all other rubber products."

Production of conveyer belting, one of the bottleneck items in industry today, was given a boost by increasing the allowable percentage of natural rubber. This was done to speed up the processing of belting and insure quicker delivery, Mr. Sears explained.

Of importance to tire manufacturers is a small amount of natural rubber allocated to tire cord dip to improve factory processing and eliminate production difficulties, Mr. Sears pointed out. This will also improve tire quality as it will result in better bonding of synthetic rubber to cord fabric.

Certain special-purpose tires such as earthmover, rock service, and logger have been allowed additional amounts of natural rubber.

Developments in Management-Labor Relations

Following the improved trend of management-labor relations in the industry during January, developments during February finally resulted in a precedent-setting agreement by the Big Four companies, United States Rubber Co., Goodyear Tire & Rubber Co., The B. F. Goodrich Co., and Firestone Tire & Rubber Co., to bargain as a unit with the United Rubber Workers of America (CIO) on wages and hours. The suggestion for the conference was made by the union and finally agreed to by all of the above-mentioned companies. The meetings began at the Mayflower Hotel in Washington, D. C., February 19. After hearing talks by both management and union officials, foremen at the Goodrich plant in Akron on February 5 voted 413 to 301 in favor of representation by the Foremen's Association of America. The Goodrich local of the URW at Akron on February 4 also voted 2,695 to 60 in favor of strike action. Maintenance and engineering workers at the Goodyear Akron plant approved acceptance of an offer of a 9¢ an hour general wage increase, plus adjustments of 4¢ to 5¢ an hour, on February 3.

The Big Four-URW Conference

The URW executive board at a meeting in Washington late in January invited the management of U. S. Rubber, Goodyear, Goodrich, and Firestone companies to meet with the union on a limited "industry-wide" basis with the belief that agreements worked on with the Big Four would set a pattern for the whole industry. After certain details, such as just what subjects in the wage-hour picture should be discussed and whether or not agreements made with the international URW union officers would be binding on the various local unions, the conference got under way in Washington on February 19. It was stated that the URW's seven-point wage-hour program, which includes demands for a 30¢-an-hour wage increase, a 30-hour work week of five six-hour days, and other concessions, would be the basis on which the negotiations would be conducted.

"Prior commitments, if any, by one company on any of the points at issue shall not be binding on the Big Four," a joint statement said.

"However, negotiations by the union on a Big Four basis do not release any one company from prior commitments that may heretofore have been made by such company and union," it was added.

It is understood that company representatives will include Fred Climer, of Goodyear, W. R. Murphy, of Firestone, D. D. Reichow, of Goodrich, and E. M. Cushing, of U. S. Rubber. L. M. Buckingham, of Akron, and T. S. Markey, Firestone attorney, will act as co-counsels for the companies. The URW international will be represented by L. S. Buckmaster, president, H. R. Lloyd, vice president, and G. L. Patterson, general counsel. Local URW unions will be represented by George Bass, president of Goodrich local No. 5; C. V. Wheeler, president of Goodyear local No. 2; I. H. Watson, president of Firestone local No. 7; and officers from some of the U. S. Rubber Co. local unions.

Some concern has been expressed that the White House wage-price executive order issued on February 15 which specified that industries such as rubber, where no wage-increase pattern has been set since August 18, 1945, might delay the final result of the Big Four-URW meeting because of the necessity of obtaining approval from the new Wage Stabilization Board for any wage increase before it could be put into effect. The exception to this rule is where the employer is willing to waive his right to apply for a price increase based on the wage increase granted. Obviously the industry does not wish to put itself in this classification. It is understood, however, that any or all agreements made by the Big Four at this conference will be with the stipulation that they will be processed through the Wage Stabilization Board and that the necessary price increase will be requested. Chester Bowles, the new Economic Stabilization Director, on February 15 promised that unions, such as the URW, which had refrained from striking to force wage increases since VJ Day would get prompt action on approval of wage increases arrived at by independent collective bargaining. In general it was felt late in February that the settlement of wage and hour disputes between the Big Four and the URW would be speeded by the Washington conference since all the ground work would be done when the agreement was submitted to the Stabilization Board for approval.

A press conference was held in Washington on February 22, but representatives of the companies and the union stated that since the talks to date had been concerned almost entirely with the scope of the proposed negotiations, rather than the actual matter of wages and hours, no detailed statement was warranted at that time. The conference was expected to last until about March 8.

Since the negotiations were satisfactorily concluded on March 2, it is possible to report briefly on the results in this issue. These negotiations were concerned with the seven-point program of the URWA only. With regard to the question of a wage increase, an 18½¢-an-hour flat increase was granted by the Big Four for all plants involved in the negotiations, and the increase was to become effective in each of the plants on the first pay period following March 2, 1946. However the above increase will require approval of the agreement by all local unions involved, and a decision by the National Wage Stabilization Board regarding the increase, before it is made effective. Also included in the agreement was a stipulation for retroactive payment of 12¢-per-hour to all employes from November 1, 1945.

Other items covered included approval of the payment of double time for all work performed on Sunday as such and on the six legal holidays, but not for holidays not worked. Time and one-half will be paid for hours over eight per day and 40 per week.

Only the plants of the Big Four companies having contracts with the URWA in the United States and only the employes in those plants who are a part of the bargaining unit are covered by the agreement. This condition excludes office and plant protection employes since it was decided early in the negotiations that they would not be included.

It is understood that much credit for the success of the negotiations should go not only to the management and union representatives concerned, but also to two Labor Department Conciliation Service Commissioners, Paul Fuller and George Morrison. Mr. Fuller was recently appointed "Rubber Commissioner" for the Conciliation Service and devotes his entire time to settling disputes in the rubber industry. Both Mr. Fuller and Mr. Morrison, his assistant, are now established in Akron.

Akron Goodyear Maintenance Workers Get Raise

Goodyear in Akron during January offered maintenance and engineering workers a 9¢-an-hour increase, but this was rejected by the URW Goodyear local No. 2 because the date when the increase was to have become effective was not satisfactory to the local union. Early in February the offer was accepted retroactive to November 1, 1945. Under the new rates these workers will make about $1.40 an hour. This engineering department increase will not be considered by the union as making up any part of the union's current demand for a 30¢-an-hour general increase for all Goodyear workers, it was stated by the local union.

Goodrich Foremen Choose Union

After having heard talks by both management and union officials of the Foremen's Association of America for and against unionization and selection of the Association as their bargaining agent, the foremen at the Akron Goodrich plant voted on February 5 in favor of unionization and representation by the FAA, 413 to 301. Meetings attended by foremen and other supervisory officials of the Goodrich Akron plant were held prior to the voting, at which John L. Collyer and T. G. Graham, president and vice president, respectively, of the company, were speakers. Robert H. Keys, FAA president, spoke to the Goodrich foremen at a meeting at the Canadian Legion hall in Akron on February 3. This action by the Goodrich foremen is expected to result in legal action by the company which objects strongly to unionization of its foremen.

Strike Settled in Bead Wire Plants

A four-week strike at two plants of the National Standard Co. at Akron and Niles, Mich., which had threatened to interfere with tire production, was settled February 11. Pharis Tire & Rubber Co., Newark, O., had been forced to shut down because of lack of bead wire, and Firestone, Goodrich, and Seiberling Rubber Co. at Akron were reported to be nearly out of bead wire on February 10.

The National Standard Co. stated that a 18½¢-an-hour wage increase had been agreed upon, effective immediately. A clause was included in the new contract to provide for any necessary future adjustment so as to conform with the raise agreed upon in the Big Steel settlement. Retroactivity of the raise also will conform to the Big Steel agreement, company and union officials reported.

OPA Footwear and Other Changes

Amendment 4 to RMPR 229—Retail and Wholesale Prices for Rubber Footwear—effective February 4, establishes retail and wholesale dollar-and-cent ceilings on approximately 90 new items of waterproof rubber footwear which have been out of production since 1941. This action follows the recent establishment of manufacturers' ceilings for the same items. This footwear covered comprises various sizes of rubbers, rubber boots, and similar items for men, women and children. Manufacturers now have sufficient synthetic rubber supplies to resume production of this footwear. The new ceilings are in line with ceilings established for synthetic rubber footwear produced during the war. These prices are slightly higher than the 1941 prices of footwear made of crude rubber. For the convenience of sellers, the new ceilings have been collected in one table, including all waterproof rubber footwear for which dollar-and-cent ceilings have been established.

Simple methods have been established for retailers and wholesalers to determine their maximum prices on specialty items of rubber footwear not produced during the war and now coming back on the market (Amendment 5 to RMPR 229—Retail and Wholesale Prices for Certain Rubber Footwear—effective February 26). At the same time wholesale and retail dollar-and-cent ceilings have been established for men's and boys' canvas basketball shoes with molded sole in colors other than black. The new retail ceilings are 10¢ a pair higher than the ceilings for the same shoes with black soles, and on the average, approximate the varying formula ceilings heretofore applicable to these colored-sole shoes. Specific ceilings have been established to assure retailers their normal mark-up. Wholesale ceilings remain the same, being merely translated into specific dollar-and-cent levels.

Order 102, SO 94, establishes maximum prices for sales by any government agency and by subsequent resellers of certain men's black rubber whole heels available for sale by the government disposal agency.

Order 11, MPR 200, authorizes maximum prices for Neo-Cord oil-resistant men's rubber soles and heels made by Gro-Cord Rubber Co., Lima, O.

Orders 12 and 13, MPR 200, sets ceilings for women's single-unit rubber tennis soles and heels and Avonite molded full soles, respectively, made by Avon Sole Co., Avon, Mass.

Region VII Orders G-2, 3, 4 under Supp. Service Reg. 47 to RMPR 165 covers ceilings for retail shoe repair services in Colorado, New Mexico, and Utah-Arizona respectively.

Other Rubber Goods Orders Affected

Amendment 11, MPR 435—New Bicycle Tires and Tubes—changes the brand name of a listed group of tires, adds several brand names to price tables, adds additional prices for certain new sizes of original equipment assemblies not heretofore priced specifically in the regulation, and simplifies the pricing of factory seconds. At the request of The Pharis Tire & Rubber Co. the Zephyr brand of tires in the order is changed to Iroquois. New brand names include Safti-Cycle, of Safti-Cycle, Inc.; Crest Heavy Duty, of Gamble-Skogmo, Inc.; Puncture Resistant, Goodyear Tire & Rubber Co., Inc.; and Pharis thorn-proof.

Order 100, SO 94, establishes ceilings at which three sizes of new tire chains may be sold by the War Assets Corp. or any other United States Government agency and by any subsequent reseller.

Orders 87 and 88, RMPR 528, establish, respectively, ceilings for a U. S. industrial solid tire and for Fisk neoprene industrial pressed-on solid tires, industrial solid tires, and industrial retreads—all products of United States Rubber Co.

Manufacturers' ceilings for rubber flooring other than of neoprene have been increased approximately 11% by Amendment 23 to MPR 149—Mechanical Rubber Goods—effective February 18. This increase is allowed under the reconversion formula which takes into consideration legal changes since 1941 in raw material prices and in basic wage rates and provides the industry with its average peacetime percentage profit margin over total costs. The new ceilings are in dollar-and-cent and are uniform for the entire industry. Retail prices are not affected by Amendment 23. This rubber flooring is generally sold by manufacturers to contractors for use in new buildings. Manufacturers' ceilings for neoprene flooring continue at their January 6, 1942, "freeze" levels.

Manufacturers of rubber mats or matting may apply for individual adjustments in their ceiling prices, according to Order 56 under MPR 149. This action, effective February 18, is taken to avoid any threat to production arising from the use of higher priced raw materials due to a scarcity of reclaimed rubber, normally used for such mats. OPA said that manufacturers are using in varying degree GR-S which is approximately three times as expensive as reclaimed rubber. With the costs differing for each manufacturer, an overall adjustment providing industry-wide uniform price ceilings is not feasible at present. Individual adjustments, consequently, represent the best method of providing equitable ceilings for the industry. Adjustments will be allowed on the basis of current rubber costs in lieu of 1941 rubber costs, the agency said. Any ceiling price increases granted an individual manufacturer will be reflected in the retail ceilings for rubber mats or matting, only in those cases where the reseller's expense rate is not covered by the present resale price.

Amendment 11, MPR 478—Coated and Combined Fabrics—provides supply jobbers of these fabrics with new and easier methods of determining their maximum prices. The amendment also makes minor changes relating to coverage of MPR 478; cash discount allowances; reporting by supply jobbers and method of computing prices on coated fabrics made from government surplus finished goods.

Orders 162 and 163 cover ceilings for coated fabrics of Hood Rubber Co., Watertown, Mass.

Amendment 4, Order 208, MPR 580, adds to the price listing U716 pommel saddle coat—men's rainwear—made by Climatic Rainwear Co., Inc.

Amendment 2, Order 98, MPR 580, sets maximum prices at which an Elasti-glass raincape and a golf jacket may be sold. They are products of S. Buchsbaum & Co. Amendment 4 to Order 58 covers ceilings for the Captain coat of Rainfair, Inc.

Amendment 5, MPR 297, removes Congo Copal gum from the order, and it thus becomes subject to the Maximum Import Price Regulation.

Order 18, SO 142, covers maximum prices for sales by Crescent Insulated Wire & Cable Co., Inc., Trenton, N. J., of its non-metallic sheathed cable with rubber insulated and with thermoplastic insulated conductors.

Order 244, MPR 591, authorizes maximum net prices for sales by Firestone Tire & Rubber Co. of Velón plastic screen cloth manufactured by Firestone Industrial Products Co. Order 265 sets ceilings for Permacel woven splice tape made by Industrial Tape Corp.

Order 302, MPR 591, authorizes maximum prices for 16 by 16 mesh plastic insect screen cloth manufactured by Firestone Industrial Products Co.

Order 111 under 3 (e), GMPR, applies to sales of Plaflote, Rent-a-Flote, and Funflote rubber air beach mattresses made by Hodgman Rubber Co., Framingham, Mass.

Region III Order G-9 under SO 119 increases ceilings of household rubber goods made by Wooster Rubber Co., Wooster, O., including drainboard, stove top, floor, door, utility, and shower stall mats, sink strainers, stoppers, and shovels, dust pans, kneeling pads, table protectors, dog feeding and soap dishes, steel wool holders, plate and bowl scrapers, and dish drainers.

Amendment 14, SO 126—Exemption and Suspension of Certain Articles of Consumer Goods from Price Control—indefinitely suspends price control on all toys and games except "wheel goods"—metal wagons longer than 18 inches, velocipedes, tricycles, miniature automobiles, etc.—on which controls will remain until the danger of sharp price increases and of the diversion of still-scarce metal and rubber is past.

Comprehensive Fabrics, Inc., Empire State Bldg., New York, N. Y., featured Koroseal applications at the formal opening on February 13 of its new showrooms in the Merchandise Mart, Chicago, Ill. The showing, conducted in cooperation with The B. F. Goodrich Co., Akron, O., was similar to that presented in New York, which was reported in our September, 1945, issue. Executives of Midwest stores, designers, homemaking and apparel experts, and the press were guests of Joseph A. Kaplan, president of Comprehensive Fabrics. At a luncheon in the Merchants & Manufacturers Club opening the "Koroseal Highlights" show, Waldo Semon, of Goodrich, director of pioneering research and inventor of Koroseal and Ameripol, discussed the quality and variety of new applications for Koroseal. According to Edmund C. McCarthy, vice president of Comprehensive Fabrics in charge of the Chicago offices, the special setup in the new showrooms will be open to buyers and merchandise personnel for several weeks.

EASTERN and SOUTHERN

Witco Acquires Franks

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., has acquired Franks Chemical Products Co., Brooklyn, N. Y. No change will be made in the present management, and Joseph M. Franks will continue as president. The company, however, will be known as the Franks Chemical Products Co. Division of Witco Chemical Co.

Franks Chemical was incorporated in 1923 to manufacture stearates, and the line now includes aluminum, barium, calcium, lead, magnesium, sodium, and zinc stearates. Besides U.S.P. zinc stearate for the drug industry, a special grade is produced for use in cosmetics. Other applications for stearates include high-pressure lubricants, paints, printing inks, waterproofing, rubber, plastics, crayons, wire drawing, etc.

Since acquisition by Witco, the plant capacity has been doubled to meet the requirements for stearates by industry. Witco research facilities are being employed to the fullest extent both in maintaining the quality of product responsible for the excellent reputation enjoyed by the Franks Company for many years and adding to it the accumulated experience of the Witco organization.

Littlejohn & Co., Inc., crude rubber brokerage, 120 Wall St., New York 5, N. Y., has announced that Frank S. Rutter has joined its organization. Mr. Rutter was formerly with Charles E. Wood, Inc., for 26 years and was its president from 1942 until this February, when he became associated with Littlejohn.

General Cable Corp., 420 Lexington Ave., New York 17, N. Y., has transferred Leslie D. Carver, technical superintendent of its plant at St. Louis, Mo., to New York headquarters, engineering department, as engineer on rubber insulated cable products.

First Machinery Corp., East 9th St. and East River Dr., New York 9, N. Y., was among those forced to move when the New York Housing Authority took over that area for a model housing project. Rather than transfer to new quarters the tremendous amounts of very heavy chemical, food, and process equipment which it had on hand, First Machinery Corp. disposed of, by auction on February 27 and 28, these machines and tools.

The company has also purchased a building at 157 Hudson St., New York, which will be new headquarters and ready for occupancy about March 31. It is planned to equip this building with every modern device and facility to rebuild chemical, food, and process equipment. First Machinery, of which Fred R. Firstenberg is president and Louis J. Shapiro vice president, intends not only to continue the purchase and resale of used equipment, but will also act as sales representative for many manufacturers of equipment used in this specialized field.

K. C. Gardner, Jr.

United Engineering & Foundry Co., Pittsburgh, Pa., has elected K. C. Gardner, Jr., vice president in charge of operations. A son of K. C. Gardner, president and general manager, the new vice president formerly was assistant to the general manager in charge of operations. The company also announced that two vice presidents have been given new assignments in addition to their other duties. Geoffrey G. Beard has been designated vice president and executive assistant to the president; while William Hagel, formerly vice president in charge of machinery sales, has been made vice president in charge of sales.

Whittaker, Clark & Daniels, Inc., 260 W. Broadway, New York 13, N. Y., has added to its sales staff Frank H. Smart, formerly of the plastics division of E. I. du Pont de Nemours & Co., Inc. Mr. Smart will handle Whittaker's general line of non-metallic minerals in the State of New York, specializing in the plastics field. A graduate of New York University, Mr. Smart has had eight years' experience with plastics, having done control development and sales work on cellulose nitrate, cellulose acetate, polyvinyl resins, acrylics, polyamides, and polyethylene resins.

Revertex Corp. of America, supplier of latices, has moved its offices from 37-08 Northern Blvd., Long Island City 1, to 274 Ten Eyck St., Brooklyn 6, N. Y.

Amecco Chemicals, Inc., manufacturer of synthetic organic chemicals, has sold its Rochester, N. Y., plant. Manufacturing operations formerly conducted at this plant are being transferred to Dover, O., and Henderson, Nev., where production facilities will be greatly expanded. In the meantime customers are being supplied from warehouse stocks. The headquarters and sales offices of the company are at 60 E. 42nd St., New York 17, N. Y.

Sporting Goods Convention

The 1946 convention of the National Sporting Goods Association was held in the Hotel New Yorker, New York, N. Y., on February 3 to 8, with a record attendance. As in wartime years, synthetic rubber was featured in many of the articles exhibited. The quality of rubber was believed to be much higher than that of the war years owing to the decreased use of reclaim and, in some cases, the admixture with small percentages of natural rubber. Opinion of the manufacturers as to the relative merits of their products made with synthetic rubber as compared with natural rubber was varied. In general the industry is expectantly awaiting return to natural rubber when available.

Companies exhibiting products containing rubber included Hodgman Rubber Co., North British Rubber Co., Athletic Shoe Co., W. J. Voit Rubber Corp., A. G. Spalding & Bros., Inc., Pennsylvania Rubber Co., Wintark, Inc., Seamless Rubber Co., Boston Athletic Shoe Co., Wilson Sporting Goods Co., Sea Net Mfg. Co., New York Rubber Corp., Converse Rubber Co., Atlantic Products Corp., Burke Golf Co., Brooks Shoe Mfg. Co., Brooks Mfg. Division, MacGregor Golf, Inc., and MacGregor-Goldsmith, Inc.

Hewitt Rubber Corp., Buffalo, N. Y., has announced three new executive appointments. F. C. Traver, formerly with the Gates Rubber Co., Denver, Colo., has been made manager of the molded products division, a new position created by Hewitt's expansion of molded rubber items. The company has ordered a large volume of special equipment for this production, which will be installed in the new plant recently acquired. President Thomas Robins, Jr., said the molded goods program will be pushed aggressively during the first part of 1946.

Robert A. Nilsen has been appointed production superintendent of Restfoam (Hewitt foam rubber). He was previously production superintendent of the latex foam division of United States Rubber Co. in Mishawaka, Ind.

L. C. Holloman, formerly of the production department, has been appointed to the sales staff in charge of Restfoam product development and sales to manufacturers in the furniture, transportation, and allied fields.

Portable Products Corp., Pittsburgh, Pa., has appointed new sales managers for the Paul & Beekman Metal Stamping Division at Philadelphia and the C. J. Tagliabue Instrument Division at Brooklyn, N. Y., according to John C. Sykora, vice president and director of sales. E. R. Jacobson is now sales manager at Paul & Beekman, coming from the Gould Storage Battery Corp., where he was New York sales manager for the industrial battery division. A. G. Koenig is new general sales manager of the Tagliabue Division where he succeeds E. D. Wacker, previously appointed general manager of the division. Mr. Koenig has been with Tagliabue since 1928 when he was made southwestern manager with headquarters in Dallas, Tex.

Calco Chemical Changes

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has appointed J. H. McMurray as an assistant manager of Calco. This appointment is in line with the recently announced plans for the expansion of plant facilities and the return to peacetime production that will entail multiplied problems of management. Mr. McMurray formerly was Calco's director of engineering and construction. In 1915 while attending Pratt Institute, he did special work for the Calco Chemical Co., then in its infancy. Later, after attending Yale University, he returned to Calco as chief draftsman. During World War I he served as a Captain in the Ordnance Department; then returned to Calco as superintendent of maintenance and construction and later as divisional manager, chairman of the works committee, and director of engineering and construction.

C. E. Mensing was appointed director of engineering, C. L. Jones, chief engineer, and J. F. McGreevy, assistant manager of maintenance.

Ames B. Hettrick has been made assistant manager of the Calco pigment department. He had been manager of the former Virginia Chemical Corp., titanium dioxide plant, at Piney River, Va., since its acquisition by Calco. He will continue to make his headquarters at Piney River, directing the company's expansion program to increase the production of titanium dioxide at the Piney River and the Gloucester, N. J. plants. Mr. Hettrick, formerly vice president and general manager of the Virginia Chemical Corp., is a graduate of the Massachusetts Institute of Technology in Engineering Administration. First employed by Stone & Webster Engineering Corp., he joined the Southern Mining Products Corp. in 1930 as chief engineer and later as plant superintendent. In 1936 he was named vice president and general manager of the Virginia Chemical Corp.

Roland V. Tailby has been made personnel manager of the Calco organization. Mr. Tailby, assistant personnel manager since coming to the company in April, 1944, has been acting manager for the last several months. He is a graduate in engineering of Rutgers University, Class of 1923, a member of the Kiwanis Club, technical societies,

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Hercules Powder Co., Wilmington, Del., has appointed Frank G. Oswald assistant sales director of the synthetics department of Hercules Powder Company, according to W. M. Billing, general manager of the department. Mr. Oswald will assist in general sales policies, sales training, and in coordination of technical sales activities. Mr. Oswald had been manager of the synthetics department technical service division which is being discontinued in order to broaden sales activities of the department. He will, however, continue to handle technical problems. The department, moreover, is establishing a new group to handle the market development of new products, with Malcolm C. Moore as manager, and J. Glenn Little as assistant manager. Others assigned to the group are Paul Johnstone and James Monkman.

New Rubberset Executives

Rubberset Co., 56 Ferry St., Newark, N. J., recently elected Elwood M. Jones, Jr., vice president and general sales manager, and Raymond A. Nash, vice president and general factory manager, according to President G. L. Herrick. In his new post, Mr. Jones will direct the sales of Rubberset paint brushes, lather brushes, and toilet brushes as well as the sales of Wm. Peterman, Inc., insecticides. Mr. Nash will direct plant operations and production in all the Rubberset and Peterman factories. Working under Mr. Jones will be R. H. Seltzer, assistant sales manager of insecticides and toilet brushes; P. A. Lee in charge of special sales; T. H. Logan, Jr., in charge of special sales through food broker outlets; J. F. Smith, assistant to the general sales manager; R. D. Freeman, in charge of sales control and statistics; W. R. Wright, metropolitan division manager; J. L. La Croix, central division manager; G. N. Peay, Jr., western division manager; D. R. Jack, export manager, and E. R. Brown, advertising manager. Mr. Jones, who was born in Manila, P. I., and graduated from the University of Southern California, joined Rubberset as a salesman in 1937 covering California. In January, 1943, he became assistant sales manager in charge of the company's paint brush division. Mr. Nash, a native of Sewickley, Pa., after studying at the Carnegie Institute of Technology, began his business career as a fitter's helper with the American Bridge Co. He came to Rubberset as a divisional superintendent, becoming plant manager in 1941.

A. Schrader's Son Division of Scovill Mfg. Co., Brooklyn 17, N. Y., has revealed that the Schrader 2180 Dubltite valve was used in the inflated rubber boats and ordnance equipment built as decoys before the invasion of France on D-Day. The cap portion of the valve had a floating check built in to prevent the escape of air in the boat or container during the pumping operation, and the cap was secured with a hold-fast chain to prevent loss when temporarily removed from the body. The valve is still being used by the Army Air Forces on emergency landing rafts.

A. G. Spalding & Bros., Inc., New York, N. Y., held its annual meeting on February 5. President Charles F. Robbins told stockholders that synthetic rubber tennis balls had been more readily accepted by the public than synthetic rubber golf balls, but that the amount of natural rubber to be allocated for golf balls would not fill demands as pressure was great for the return to the natural rubber product.

Foster D. Snell, Inc., firm of consulting engineers and chemists, 305 Washington St., Brooklyn 1, N. Y., has announced that Robert Schmeidler, lately a colonel with the Army Air Forces, has joined its staff as business manager. Before his service in the Army, Mr. Schmeidler had been with United Piece Dye Works for more than ten years.

Kinsman Succeeds Raskob

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., on February 18 announced that John J. Raskob resigned as a director and vice president, thus terminating a connection with the organization that began in 1902. J. Warren Kinsman, general manager of the fabrics and finishes department of the du Pont company, was elected by the board to succeed Mr. Raskob.

Mr. Raskob, whose resignation was due to a desire to make place for younger blood in the organization, had served as stenographer to Pierre S. du Pont, assistant to the treasurer, a director, treasurer, and member of the executive and finance committee.

Mr. Kinsman started with the company on May 1, 1915, as a foreman in the Bayway, N. J., plant of the high explosives operating department. In 1917 after a short time in the Fabrikoid department he was transferred to the sales department at the former Du Pont Chemical Works; then after serving as assistant supervisor in the smokeless powder plant at Carney's Point, N. J., in 1918, he spent two more years in Chemical Works sales, and later was made a special assistant in the dyestuffs department. In 1924 he became assistant director of sales for that department and in 1929 director of sales for the organic chemicals division. After two years he became director of sales for intermediates and exports and manager of the alcohol division of the newly formed organic chemicals department. In August, 1941, Mr. Kinsman was made assistant general manager of the plastics department, but was transferred to the same post in the organic chemicals department in February, 1943, and took his present position in October, 1944.

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., has appointed William L. Platt sales representative for the Columbia Chemical Division, with headquarters at the company's offices, 300 Babcock St., Boston, Mass. Mr. Platt is a graduate of Purdue University, Class of 1927, with a B.S. in chemical engineering. Prior to his appointment to the Columbia Chemical Division in 1930, he was with the company's glass division. During his 16 years with Columbia Chemical, he has specialized in industrial engineering as well as in various phases of the production of heavy chemicals.

Columbia Chemical Division, Pittsburgh Plate, has moved its executive offices to Fifth Ave. at Bellefield, Pittsburgh 13, Pa. These temporary quarters have been necessitated by the lack of sufficient space at the former address to accommodate personnel returning from military service and other expansions of the Columbia organization.

The Flintkote Co., East Rutherford, N. J., has added to its technical staff Harlan A. Depew, formerly manager of the fluoride titanium plant at Gloucester City, N. J. From 1932-40, Dr. Depew was director of research for The American Zinc Sales Co., Columbus, O.

U. S. Rubber Developments

In its fifty-fourth annual report to stockholders United States Rubber Co., Rockefeller Center, New York 20, N. Y., revealed that many advances in synthetic rubber technology were registered by the company during the past year. Emphasized were Rosin Soap GR-S; a concentrated synthetic rubber latex providing greater uniformity and ease in handling and shipping and most suitable for saturating paper and fabrics for shoe parts and artificial leathers, for backing of pile fabrics for upholstery and carpets, and for solutioning of tire cord; a new synthetic rubber with special processing qualities required for footwear; another for lining corrosion resistant tanks; and another which for the first time makes possible a white GR-S.

As part of the agricultural program to bring the products of its laboratories and factories within reach of the farm, the company will present an exhibit, "Science Serves the Farm," at the Stevens Hotel, Chicago, Ill., on April 1 to 6 inclusive. In addition to the numerous rubber products to be shown, which will include all types of tractor, implement, and truck tires, protective clothing and footwear, belting, hose, rubber-covered wire and cable, the exhibit will also contain many non-rubber items including chemicals for use in crop control, and the fireproof fabric, Asbeston.

A Butyl tube, the first mass-produced civilian unit to come from the production lines of U. S. Rubber's Los Angeles plant, was presented recently to William Jeffers, wartime Rubber Director, by D. W. Walsh, the company's Pacific Coast tire manager. In making the presentation, Mr. Walsh pointed out that tests showed the Butyl tube to be greatly superior to natural rubber in air retention qualities and resistance to chemical deterioration. Leaders of the nation's rubber industry took the occasion to honor Mr. Jeffers for his work in organizing it for war. A telegram from Herbert E. Smith, president of U. S. Rubber, read as follows:

"The synthetic rubber program which you headed during the war still remains one of the world's greatest industrial achievements. For want of rubber the war might have been lost, but thanks to you, Bill Jeffers, our country and its allies obtained this most urgently needed commodity in record time. As a result, we fought and won a mobile war and kept civilian transportation rolling on synthetic tires on the home front, too. As a token of our recognition of your outstanding contribution to winning the war, we would like to present you with the first Butyl-type synthetic tube made at our Los Angeles plant for civilian use."

Secretary Eric Burkman, on behalf of the company at a testimonial dinner at the Hotel Astor, New York, February 5, received a Certificate of Public Service from the Brand Names Research Foundation for the rubber company's official seal, which has been used to identify its products for more than 54 years.

New Expansion Program Under Way

To transform the knowledge of chemicals gained during wartime into products of increased quality for industrial and civilian use, more than $2,000,000 will be spent to expand the facilities of the Naugatuck Chemical division at Naugatuck, Conn. This new plant expansion is part of a three-way program to meet the increased demands for rubber chemicals, latex, dispersions, and agricultural chemicals; for the production of new plastics with almost unlimited industrial and commercial applications; and to further general scientific research. The expansion program includes the construction of eight new buildings, all of which are expected to be in operation before the end of 1946.

Ground will be broken in April for a new, modern laboratory and a new pilot plant which, when completed, will increase laboratory and pilot plant facilities at the chemical division by more than 50%. Simultaneously with this new laboratory expansion, process development facilities will be enlarged.

Also scheduled to start construction in April are a plant for the production of rubber chemicals, another plant for the manufacture of small volume products, and a new building to house service departments, such as purchasing, traffic, industrial relations, and safety.

Currently under construction is a new plant which will provide increased capacity for the production and handling of dispersions of reclaimed rubber. Two new plants for the production of rubber chemicals have been completed and will attain full production this spring.

Personnel Promoted

Ernest J. Joss, former manager of the Des Moines, Iowa, plant has been assigned to the company's general offices in New York as administrative assistant to Ernest G. Brown, vice president and general manager of the mechanical goods, general products, and "Lastex" yarn and rubber thread divisions. Dr. Joss was born in Anaconda, Mont., and educated at the University of Oklahoma, University of Kansas, and Cornell University. He started his rubber career 20 years ago as a chemist in the company's research laboratories and worked on synthetic rubber. From 1931 to 1941 he was connected with the company's Providence, R. I. plant, first as a chemist and later as assistant development manager. In 1941 he was appointed assistant technical director of the Army ordnance plant in Des Moines and was appointed manager in 1943.

Raymond E. Callahan, former control manager of the Charlotte, N. C., plant, has been made administrative assistant to Mr. Brown. Mr. Callahan, who will specialize in cost accounting, started with the company as an accountant in cost analysis 12 years ago. He spent several years as a traveling accountant and later developed cost systems at the company's plants in Mishawaka, Ind., and Bristol, R. I. He was control manager in Bristol from 1935 until 1942, when he was transferred to the ammunition plant at Charlotte operated by the rubber company for the government.

Luther B. Martin has been made technical director of the production department of the company's tire division and will be succeeded as director of the tire development department by Arthur W. Bull. In his new capacity Mr. Martin will be a member of the staff of C. L. Wanamaker, production manager of the company's tire division. Both Mr. Martin and Dr. Bull will continue to have their headquarters in Detroit. Mr. Martin joined U. S. Rubber in April, 1918, as a chemist at its Hartford Rubber Works, Hartford, Conn.; he later was promoted to chief chemist and factory manager. In 1929 he was transferred to Detroit, where he became manager of tire quality and later, assistant director of tire development. Last March he was named director of tire development and research.

Dr. Bull started with the company in 1928 in research at the company's general laboratories at Passaic, N. J., and at Naugatuck, Conn. He was transferred to the tire development department at Detroit in 1932, later becoming manager of the tire engineering department. During the war he served as development manager in the company's vast production of self-sealing fuel tanks for military airplanes. He became associate director of tire development in 1945.

With the announcement of the opening of several new branches by U. S. Rubber, W. D. Baldwin, sales manager, U. S. Tires division, also reported appointments of new district managers for these branches and other departmental appointments. The new branches are for the Jacksonville, Fla., district, with William O'Sullivan as district manager; Cleveland, O., district with J. L. Updegraff, district manager; and for the Indianapolis district, M. M. Littlejohn, district manager.

E. J. Bassine, formerly district manager at Philadelphia, has been made district manager for the New York district, replacing G. C. Gaillard, assigned to the general office. E. B. Magowan, formerly assistant district manager at Philadelphia, has been named district manager there.

J. C. O'Gorman has been appointed manager of the commercial merchandising department, and A. W. Fuller, manager of the farm tire department, at the company's general offices in New York.

Thirty manufacturers of rubber druggists' sundries at a testimonial dinner at the Advertising Club, New York, on February 7 honored Walter R. Douglas, who is retiring April 1 after more than 40 years, mostly with U. S. Rubber, in the sundries sales field. Mr. Douglas started with the company in 1907 as drug sundries sales manager in the Buffalo division. Subsequent advancement sent him to Chicago as sales manager in 1916, to the Providence, R. I., plant in 1932 as assistant to the general sales manager of drug sundries, and to New York in 1932 as sales manager of drug sundries and specialties for the company. On September 1, 1944, however, Mr. Douglas turned over those duties to John W. Sproul to become special assistant to H. J. Haflin, general sales manager of the company's general products division. The dinner to Mr. Douglas was arranged by E. I. Kilcup, of Davol Rubber Co., J. Thomas Gibbons, of Seamless Rubber Co., and Clyde O. DeLong, The B. F. Goodrich Co.

Price Now Westinghouse Head

Westinghouse Electric Corp., Pittsburgh, Pa., has elected Gwilym A. Price president, succeeding George H. Bucher, who has resigned that office. Under the corporation's recently amended by-laws Mr. Price, as president, will be the chief executive officer. A. W. Robertson, who, as chairman, had been the company's chief executive officer since 1929, has reached retirement age, but has been elected chairman of the board of directors under the new by-laws to continue with the company in a less active capacity. Mr. Bucher, elected vice chairman of the board, will continue to serve as chairman of the Westinghouse Electric International Co., which handles all export business of the parent company, and will have other active duties. Mr. Price, a former president of the Peoples-Pittsburgh Trust Co., Pittsburgh, was named a vice president of Westinghouse in September, 1943, a director in January, 1945, and executive vice president in May, 1945.

Frank D. Newbury, who started with Westinghouse as an apprentice engineer in 1901 and rose to become a vice president in 1941, last month was elected a director of the company.

Carl E. Nagel has been made manager of editorial service, according to Charles A. Scarlott, manager of Westinghouse engineering publications. Mr. Nagel, who returns to the company after a hitch in the Navy, will be responsible for the company's technical and trade magazine articles.

Carl E. Dreher, regional director of Brazil for the Westinghouse Electric International Co., is the recipient of the Order of Merit, highest company award. This award, a bronze medallion inscribed with a silver "W", was accompanied by a citation "for outstanding performance in the establishment and expansion of the company's business performance in foreign territory under exceptional circumstances . . ." Mr. Dreher has been with the International company 20 years, leaving the New York office in 1937 for a year's service in South Africa prior to his Brazilian appointment.

War Assets Corp., RFC subsidiary designated by the Surplus Property Administration, Washington, D. C., to dispose of capital, producers' and consumers' goods, last month declared the following material government surplus and offered it for sale: electrical wire and cable, telephone and telegraph equipment, nylon tire cord, neoprene, rubber-insulated rubber-jacketed cord.

Woburn Chemical Corp., Harrison, N. J., better to serve the needs of its New England customers, and in keeping with its expansion program, has appointed the Raw Materials Co., Boston, Mass., its New England representative to handle the complete line of Woburn fatty acids and synthetic drying oils used extensively in the paint, varnish, rubber, soap, and textile industries. Raw Materials Co. is headed by C. W. Bloom, for many years sales manager for Godfrey L. Cabot, Inc., Boston.

CALENDAR

Mar. 5.	**Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.**
Mar. 8.	**Boston Rubber Group. Copley Plaza Hotel, Boston, Mass.**
Mar. 8.	**Philadelphia Rubber Group. Kugler's Restaurant. Philadelphia, Pa.**
Mar. 18-20.	**National Association of Waste Material Dealers, Inc. Annual Convention. Hotel Astor, New York, N. Y.**
Mar. 20-22.	**Chicago Technical Societies Council. Chicago Production Show and Fourth Annual Conference. Stevens Hotel, Chicago, Ill.**
Mar. 22.	**Chicago Rubber Group. Hotel Morrison, Chicago, Ill.**
Mar. 28.	**Rhode Island Rubber Club. Crown Hotel, Providence, R. I.**
Apr. 2.	**Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.**
Apr. 2-5.	**Packaging Exposition. Public Auditorium, Atlantic City, N. J.**
Apr. 8-12.	**American Chemical Society. Atlantic City, N. J.**
Apr. 22-27.	**Society of Plastics Industry. National Plastic Exposition. Grand Central Palace, New York, N. Y.**
Apr. 27-May 18.	**International Products of Tomorrow Exposition. Chicago Coliseum, Chicago, Ill. (Postponed indefinitely.)**
June 17-20.	**American Society of Mechanical Engineers. Semi-Annual Meeting. Detroit, Mich.**
June 24-28.	**American Society for Testing Materials. Annual Meeting and Seventh Exhibit of Testing Apparatus and Related Equipment. Hotel Statler, Buffalo, N. Y.**

George Jatinen, formerly with H. Muehlstein & Co., Inc., and more recently with A. Schulman, Inc., has formed his own company, Chipco Rubber Co., to deal in scrap rubber and scrap plastics. Temporary offices of the new concern are located at 160 W. 62nd St., New York 23, N. Y.

Elmer Zahniser, 70-year-old planer operator at Adamson United Co., Akron, O., recently enjoyed a two weeks' vacation in Florida. The expense-paid vacation, which included a liberal spending allowance, was given Mr. Zahniser and his wife by Adamson United in recognition of his 50 years of continuous and faithful service with the company. Adamson United, a subsidiary of the United Engineering & Foundry Co., is one of the oldest and largest producers of basic machinery for the rubber, plastic, and plywood industries. Mr. Zahniser was employed as apprentice machinist on February 5, 1896, four years after the original company, the Adamson Machine Co., was founded.

The Okonite Co., Passaic, N. J., on March 1 moved its district office in Cleveland, O., from the Cleveland Railroad Bldg. to Room 625, Engineers Bldg., Cleveland 14. F. J. Dahleiden will continue in charge of the office.

1946 Packaging Exposition

Packaging's vital role in industry will be comprehensively visualized at the Packaging Exposition of 1946 to be held April 2-5 at Atlantic City, N. J., under the sponsorship of the American Management Association. In addition to the displays of 140 exhibiters on the main floor, the A.M.A. Packaging Conference in Convention Hall will command the attention of a large percentage of visitors during the four-day session. Much not hitherto publicly exhibited is promised for this exposition, including techniques adapted from wartime developments in packaging of ordnance material and preservation of foods. Members of the exhibiters' advisory committee of the exposition include M. C. Pollack, chairman, A. B. Clunan, Alan S. Cole, J. M. Cowan, Robert D. Handley, Roy S. Hanson, L. I. Hodgdon, H. H. Jones, M. P. Junkin, M. R. Kambach, L. L. McGrady, Paul Meelfeld, C. E. Schaeffer, and Paul Thompson. Saul Poliak will be show manager.

The Dow Chemical Co., Midland, Mich., will exhibit electronic sealing of Saran film, two Saran coating resins, and a new "Spray Packaging" technique at the exposition. Six-color printing on Ethocel sheeting, molded Styron containers and packages designed from sheeting will be included in the exhibit. The heat-sealing properties of the Saran coatings, when applied to paper and foils, will also be shown.

The Goodyear Tire & Rubber Co., Akron, O., will exhibit applications of Pliofilm packaging. This material, given wide acceptance before the war for packaging of certain foodstuffs, is suitable for use in packaging fresh fruits and vegetables, frozen foods, fresh seafood, meats, cheese, and many other products. All these, plus the packaging of delicate mechanical instruments to exclude moisture in shipment or storage, will be demonstrated at the company's exhibit.

Office of International Trade, Washington, D. C., on February 7 issued Amendment 143, Part 804—Individual Licenses, which states that no motor vehicle or other piece of equipment propelled or drawn by mechanical power, except motorcycles and bicycles, when equipped with pneumatic tires, may be exported without permission.

Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y., has opened its new Chicago sales offices at 30 North Dearborn St., Chicago 2, Ill., under the supervision of George H. Goodyear, who has been closely associated with the technical sales development of the company's products for many years. Assisting Dr. Goodyear in the technical sales of the emulsifying agents, polyhydric alcohol esters, synthetic waxes, and other special chemicals of Glyco Products will be David J. Dean and Paul Sanderson. Mr. Sanderson, for the past several years was attached to the technical staff of Mine Safety Appliances Co., and Mr. Dean was recently engaged in research in the laboratories of the Columbia Chemical Division, Pittsburgh Plate Glass Co.

OHIO

Kimball Advanced

Dan A. Kimball, a veteran of 26 years with The General Tire & Rubber Co., Akron, has been elected by the board of directors vice president in charge of special operations. Born and educated in St. Louis, Mr. Kimball served in the first World War as an aviator. He began his business career in Long Beach and in 1920 joined General Tire as a salesman on the Pacific Coast. Then in 1923 he was made branch manager in Los Angeles and in 1926 promoted to the position of western division manager. He continued as such until 1941 when he was brought back to Washington as manager of the department of government operations. In this job he negotiated with the government for the production of rockets for use in assisting planes during the take-off period. He also aided in organizing General Tire & Rubber Co. of California, which made missile rockets during the war and which now is making rockets for civilian use. Mr. Kimball is a vice president of the California subsidiary as well as of the parent company.

In his new capacity Mr. Kimball will direct the operations of the Aerojet Engineering Corp., a subsidiary with headquarters at Azusa, Calif., and General Tire of California. Aerojet makes JATO rockets for take-off assistance of military planes, and Mr. Kimball has found many commercial uses for these rockets which soon are to be introduced.

He will divide his time between California and Washington.

General Tire also has created new positions to meet expanding production requirements. A. W. Phillips has joined the organization as production assistant to C. J. Jahant, vice president in charge of operations. Mr. Phillips has had 31 years of experience in the rubber industry and during the last five years was in charge of tire production for The B. F. Goodrich Co. John L. Mead, appointed assistant to Mr. Jahant, will have charge of staff activities. He came to General from Antioch College in 1928 and since then has occupied positions in production, time study, methods, standard practice, and labor relations. Albert J. Teusch becomes assistant director of industrial relations for General plants. He had been handling personnel and labor relations at General's Wabash, Ind., factory for nine years and will now make his headquarters at Akron.

To streamline the increasing activities of General's truck tire department Karl A. Dalsky has announced a reorganization of the key personnel, as the department has been subdivided and trained men placed in charge of each phase of operation.

F. D. Gillen has been assigned the responsibilty of directing sales to manufacturers and will handle sales of all products to motor truck, trailer, airplane, and industrial equipment manufacturers.

F. R. Eyer, in charge of national accounts in Chicago and during the war General's representative to the Army Air Forces at Wright Field, is being brought to Akron to manage national account sales.

Heading aviation product sales will be Paul E. Shobert, whose responsibilities include all matters relating to sales of airplane tires, tubes, wheels, brakes, and accessories in all markets. He also will handle airplane tire distributer activities and will work with Messrs. Gillen and Eyer on manufacturers and airline business.

C. G. Myers, manager of mileage sales, will handle negotiations and service in connection with bus and taxicab accounts.

A. G. Maranville, for many years closely identified with the development of pneumatic industrial tires and wheels, will be in charge of engineering and technical problems in that field.

Robert Moran has been transferred from the stock control department to truck tire sales to serve as coordinator of Akron and field operations pertaining to truck, industrial, and airplane tires.

Improved Truck Tires Forecast

The truck tire of the future will be a double tire; one part will be the carcass, the other the tread, according to William O'Neil, president of General Tire. The carcasses being built will take two or three or even more treads before they must be thrown away. Before the war, said Mr. O'Neil, a truck tire usually was discarded when the tread wore out. There was some recapping, but the vast majority of truck operators replaced their tires when the tread was gone. During the war, fleet operators learned that new treads would add thousands of miles to the carcass. The carcasses now being made by the company, containing 30% natural rubber and 70% synthetic rubber, are superior to any made before the war and are capable of outwearing several treads. Some synthetic rubber will always be used in truck tires, explained Mr. O'Neil, as it is needed in treads to obtain wearing qualities. Improvements have been in carcasses, rather than in treads. As more natural rubber becomes available, more will be used in truck tires. In present tires the company uses 30% natural rubber, all of it in the carcass, but hopes to be able to increase this amount to 40% in the next few months and to use 25% natural rubber in the tread. Mr. O'Neil stated that it would probably be several months before sufficient materials would be available for the return of the company's premium tire that would be comparable in performance and quality to that of the prewar period.

Ohio Engineers Convention

The sixty-sixth annual convention of the Ohio Society of Professional Engineers was held in Akron at the Mayflower Hotel on February 14 and 15, with an attendance of 600 engineers. Among the many outstanding engineers, businessmen, educators, and industrialists on the speaking program was R. S. Wilson, vice president of Goodyear Tire & Rubber Co., who gave the opening address, "The Outlook for Rubber."

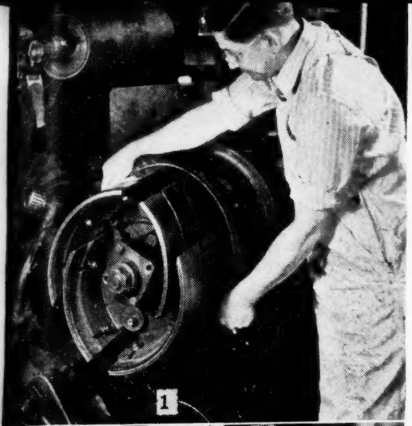
"The Engineer's Stake in Scientific Research" was the subject discussed by Howard E. Fritz, director of research for The B. F. Goodrich Co. Using the research work done on atomic energy as an example, Dr. Fritz considered the separation of scientists into two groups: the pure scientists and the applied scientists. He called for greater scientific tolerance and understanding between the two groups to achieve greater results.

J. E. Trainer, vice president in charge of production for Firestone Tire & Rubber Co., in his talk on "Engineers in Industry" stated that engineers are not taking advantage of opportunities offered them. He urged the engineering profession to get into production and manufacturing and to take its place in the community through active participation in community affairs.

The Sun Rubber Co., Barberton, O., through T. W. Smith, Jr., general manager, has announced three new Sunruco rubber office specialties. Sunruco rubber furniture shoes are used to protect fine floors, rugs, and floor coverings against gouging, marring, and spotting and to prevent skidding on marble surfaces. The shoes are manufactured in both round and square designs in eight sizes. Sunruco rubber desk guards placed at contact points of desks and other furniture prevent corner surfaces from becoming scuffed and splintered and thus banish torn clothing. These guards are made in angle and curved styles. Sunruco rubber chair protectors placed at contact points of chairs prevent marring not only of the chair, but of desks and walls as well. Three different types are available for chair arms, edges, and backs.

The Advertising Club of Akron held election of officers at its February meeting, including: president, Galen C. Cartwright, sales promotion manager, The Goodyear Tire & Rubber Co.; first vice president, Glenn E. Martin, advertising department, The B. F. Goodrich Co. Among the directors elected are A. Ray Carr, General Tire & Rubber Co.; D. C. Roads, Goodyear Tire; and Dean W. Tunberg, Firestone Tire & Rubber Co. The Club, which celebrated its first birthday at the meeting, presented to its retiring president, J. Penfield Seiberling, president of Seiberling Rubber Co., a plaque in recognition of his service during the first year of the organization's existence.

Norman G. Schabel has returned to the paint, varnish, and lacquer field and has opened an office for Advance Solvents & Chemical Corp., New York, at 505 Society for Savings Bldg., Cleveland 14, O. Mr. Schabel, who served in the Army Air Force 45 months and was a captain at the time of his release, was associated with Advance Solvents prior to going into the AAF. In his new post he will have charge of all company activities in connection with the promotion and distribution of paint, varnish, and rubber specialties in the territory comprising western New York, western Pennsylvania, Ohio, Kentucky, and eastern Indiana. He will cooperate with the local sales agents representing Advance Solvents throughout this area.



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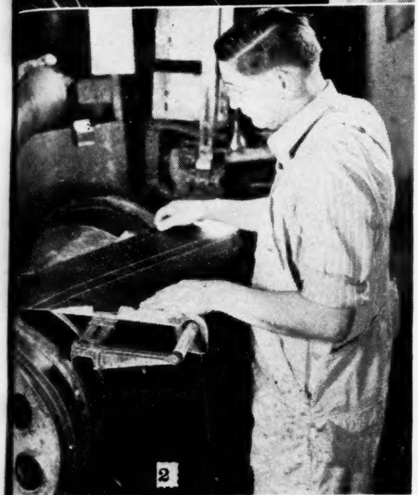

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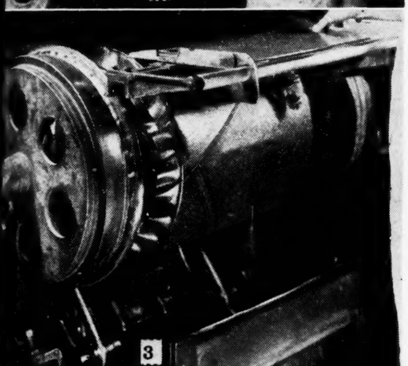

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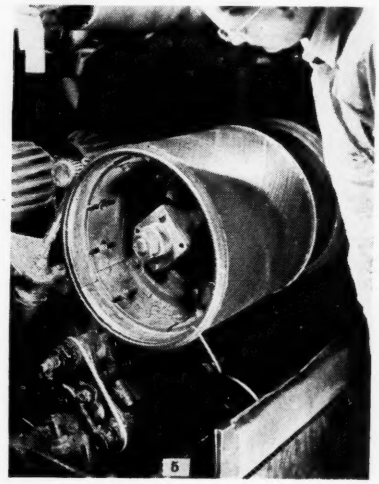
Semi-Automatic Tire Builder

Cliff Slusser, vice president in charge of production for Goodyear Tire & Rubber Co., Akron, has announced the reconversion and modernization of the company's passenger-car tire building machinery at its plants throughout the country, employing semi-automatic tire building machines for the manufacture of popular sizes. Revision of methods has made it possible to build tires up to the point of vulcanization 50% faster than by old methods. Key to the improved production machinery is the semi-automatic tire building machine which performs automatically the most difficult operations of the tire building cycle. The tire builder feeds the materials into the machine and starts its automatic operations, activated by photo-electric and electronic devices, that perform the desired functions exactly the same for every tire constructed, giving products of meticulous uniformity that could not be duplicated by previous techniques.



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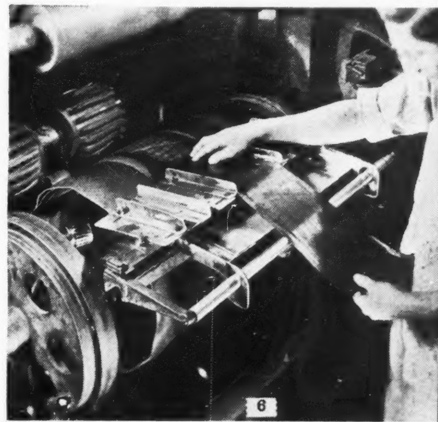
The accompanying illustrations show the building of a 6.00-16 passenger-car tire by Goodyear's veteran tire builder, C. B. Carruthers, on the company's semi-automatic machine. In Figure 1 the inside bead is being placed over the collapsed drum on which the tire will be constructed when the drum has regained its normal shape. Figure 2 shows the first of the four plies being started on the drum. The fabric, cut on the proper angle, is guided by the builder as the drum rotates. The swabbing of the first and second plies by the machine preparatory to setting of the beads is shown in Figure 3. Figure 4 pictures the machine's automatic stitchers coming into position to make the turn up of the first and second plies, after the bead setters have moved out of the way for this operation. The stitchers move back into neutral position after turning up the plies, and Figure 5 shows the plies and beads securely wrapped. A rubber breaker strip is next applied over the center of the plies in Figure 6. Next, Figure 7 shows the application of fabric chafer strips which serve to prevent the bead of the finished tire from chafing on the rim. In Figure 8 the builder is starting to apply the tread on which the design will appear when the tire has been bagged and cured. Note how the machine's tread roller assists in this operation. In Figure 9 the finished tire has been removed from the collapsed drum and is being given a rapid in-



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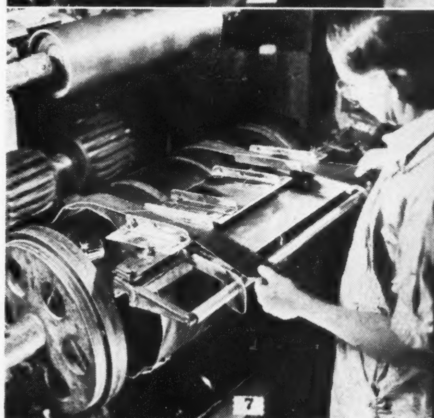

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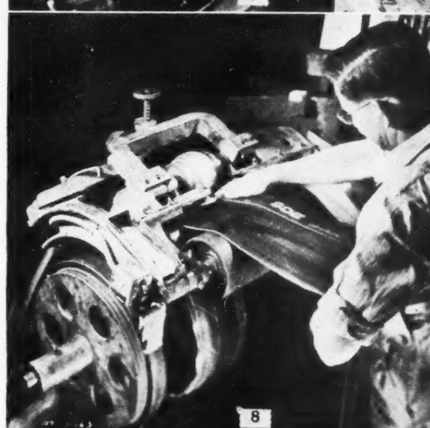

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spection before being sent to the inspection station.

Personnel Promoted

Goodyear last month announced several changes in its sales organization. R. W. Fitzgerald, formerly manager of the Detroit district, has been named western division manager, with headquarters in Los Angeles, to succeed the late E. L. Mefford. Replacing Mr. Fitzgerald in Detroit is M. C. McAlonan, manager of the Oklahoma City district, which post has been assigned to R. G. Miller, manager of Peoria district. New manager of that district is L. L. Passmore, district store supervisor, Chicago.

Assignment of A. E. Grundy to the West Coast as a Pliofilm packaging sales representative has been announced; he will be stationed at Los Angeles. Mr. Grundy joined Goodyear as a general line salesman at Los Angeles in 1928. He later served in San Francisco, Portland, Honolulu, and Philadelphia; was sales manager of the Goodyear Export Co. in New Zealand; carried out a special assignment in Peru, and was associated with the Pliofilm department until 1943 when he moved to fuel tank sales, later becoming manager of that department.

William H. Summers, former Washington, D. C., district manager for the Goodyear mechanical goods division, has been transferred to Cleveland, O., in a similar capacity, where he replaces R. E. Britt, who resigned to head The Central States Industrial Supply Co., new Goodyear jobber in Cleveland. During the war Mr. Summers was engaged chiefly in contact work in Washington, having left his post as mechanical goods district manager in Boston, Mass., in 1943. He will complete 30 years' continuous service with Goodyear this year.

E. E. Lutwack, former district manager for Goodyear at Jacksonville, Fla., who recently returned after 3½ years in the Armed Forces, has assumed his new duties as manager of the Milwaukee district, replacing John N. Lees, manager at Milwaukee since November, 1936, who has resigned because of ill health. Mr. Lutwack's Goodyear career began in 1927 as a general line salesman in the Charlotte, N. C., district. He served in the Memphis, Tennessee, and Cincinnati districts and was appointed district manager at Jacksonville in August, 1937.

Sam Dupree, who started with Goodyear in 1934, has been appointed manager of industrial molded goods sales. Mr. Dupree started with Goodyear immediately after graduation from Georgia Tech as a chemical engineer. Prior to his promotion he was in the mechanical goods development department in the Goodyear plant at St. Marys, O., from December, 1939.

Ralph W. Sohl, with the tire development department of the Goodyear company for 30 years, has been named farm tire development manager, succeeding the late Elmer F. Brunner. From 1937 to 1942, Mr. Sohl was in charge of Goodyear's tire testing laboratory and test fleet. Previously he had handled manufacturers' and field contact work, servicing tires on big dam and other earthmoving projects. From 1942 to the time of his new appointment Mr. Sohl was special field man for the development department, working closely with Army Ordnance on special projects of a military nature.

New Products Developed

New wide-base farm tractor tires that will give improved traction and approximately 40% longer tread life than conventional tractor tires were in production in eight sizes at the end of February, according to C. L. Metzger, manager of farm tire sales for Goodyear. The new tires have the open center Sure Grip tread and because of their width permit 20% more tread bar on the ground, thus increasing the traction. A new and improved tread compound is used to give longer tread life. For the convenience of dealers and farmers, the wide-base tractor tires will be dual branded, giving the new and the old sizes. The wide-base tires may be mounted on either conventional or wide-base rims, with maximum benefit obtained on wide-base rims. Conventional sizes and their respective new wide-base sizes for the tractor tires are: 9.00-36 conventional changed to 11-36 wide base; 9.00-40 to 11-40; 11.25-24 to 13-24; 11.25-28 to 13-28; 11.25-36 to 13-36; 11.25-40 to 13-40; 12.75-24 to 14-24; and 12.75-28 to 14-28.

Shinguards for mine shuttle-car tires are the latest conservation development of the company. These tire shields are circular protectors of ⅜-inch steel, which may be easily and quickly applied, and extend far enough up on the tire to protect the sidewall area where cutting or snagging might occur. No change in tire pressure is required. Use of these shields, according to W. A. Kemmel, manager of Goodyear truck tire sales, has solved many tire failures in coal mines where shuttle cars must move over sharp edges of fallen slate and rock and against projecting pillars of coal. The shields clear the tire, giving sufficient space for normal flexing without chafing of the sidewall. Shields are designed for Goodyear L-type rims, fit in place in approximately the same position taken by the rim side flange, and are held in place by lock rings, furnished with the shields.

Goodyear in its recent annual report to stockholders stated that arrangements for the acquisition of the tire plant at Topeka, Kan., have been completed with the government; the new factory near Mexico City had been brought into production; a new plant at Uitenhage, Union of South Africa, is under construction; the company's plant in Sweden, largely idle during the war, has resumed profitable operations; a new plant for making plastic raw material is nearing completion at Niagara Falls, N. Y.; a factory for expanded manufacture of mechanical goods has been purchased at Lincoln, Neb.; small rubber manufacturing plants were started last year in Colombia, Venezuela, and Cuba; the plantation in the Philippines has been recovered, but the status of the tire factory in Java and the rubber plantation in Sumatra are still listed as war losses.

The Ninth Annual American & Canadian Sportsmen's Show was held in the Public Auditorium, Cleveland, March 1 to 10. Among the firms exhibiting were Goodyear Tire & Rubber Co. and Hodgman Rubber Co.

Adds to Airplane Products

Purchase of the airplane, wheel, and brake division of Hayes Industries, Inc., Jackson, Mich., by The B. F. Goodrich Co., Akron, was reported February 18. Goodrich, a pioneer in the development of airplane tires since 1908, introduced a new type of airplane brake in 1937 which has since been manufactured under license by Hayes Industries. In acquiring the wheel and brake division of Hayes, Goodrich will now supply complete tire, tube, wheel, and brake assemblies to the aircraft industry.

Decision to add airplane brakes and wheels to the more than 80 products made by Goodrich for aeronautical uses was reached as a part of the company's postwar program to extend greatest possible service to all branches of aviation, according to James S. Pedler, Goodrich manager of aeronautical sales, who said:

"The expander tube airplane brake in which synthetic rubber is an important factor has proven its effectiveness in civilian transport and military aviation since its introduction nine years ago. Every American four-engine bomber built during the war period used expander tube brakes and Hayes wheels exclusively. We believe that it is highly desirable to provide complete tire, tube, brake and wheel assemblies engineered and serviced by one company."

Wheel and brake manufacturing operations will be continued in Jackson for the present. John H. Seaton, manager of the company's aeronautical manufacturing division with headquarters in Akron, will be in charge of the new department.

Charles Hollerith, vice president of Hayes Industries, will be associated with the Goodrich company's wheel and brake manufacturing and development program, at the same time retaining his present position with Hayes Industries.

Transfer of Personnel

Harold S. Meyer has been appointed patent counsel, heading the Goodrich patent law department. He succeeds W. F. Avery, now secretary and general counsel. Recipient of a bachelor's degree from the University of Missouri when he was 18, Mr. Meyer continued his studies in Germany at the University of Hamburg. He then joined the staff of the state chemical laboratory in Casablanca, Morocco, North Africa, where he remained a year. Returning to the United States in 1926, Mr. Meyer spent another year at the University of Missouri, then joined Goodrich in 1927, in the general chemical laboratory. Soon afterward he was assigned to research on coating metal products with rubber latex and in 1928 was transferred to the patent law department. After studying law for four years in the evening classes of Akron Law School, Mr. Meyer was admitted to the Ohio bar and to practice before the U. S. Patent Office and the Court of Customs and Patent Appeals.

J. E. Gulick, named general manager of Goodrich's tire manufacturing division, succeeds A. W. Phillips, resigned, and will direct all tire manufacturing operations of the company in the United States. Mr. Gulick was


RESISTANCE TO OILS AND FUELS
RESISTANCE TO EXTREME HEAT AND COLD
RESISTANCE TO AGING
RESISTANCE TO ABRASION
Which of these important properties
DO YOU WANT IN A SYNTHETIC RUBBER?
WANT a rubber that doesn't swell or soften in oils and fuels — one that's ideal for gaskets, sleeves, packings, diaphragms, and other oil-immersed parts? There's a Butaprene-N rubber for the job! Want one that is flexible even at minus 70° Fahrenheit? One that performs at a blistering 300°? Then look into Butaprene-N! You'll find these new Butaprene Synthetic Rubbers by Firestone remarkably versatile. They're more resistant to abrasion than natural rubber, have high tensile strength, good elongation, low compression set.
Why not find out what these remarkable new Firestone synthetics will do for you? For complete three-color chart on physical properties of Butaprene-N Synthetic Rubbers write Xylos Rubber Company, Akron 1, Ohio.
THE SYNTHETIC RUBBER OF A THOUSAND USES
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general superintendent of the deicer and fuel cell division since October, 1941. Born in Akron, a graduate of Central High School and the College of Engineering of Akron University, Mr. Gulick entered the rubber industry in 1923 after holding several production and engineering assignments in another field. He came to Goodrich in 1927 as a tire development engineer, became Akron tire division production superintendent in 1932, and later tire sales engineer and staff superintendent in the division. Made factory manager of the company's Canadian plant in Kitchener, Ont., in 1934, Mr. Gulick became manager of the interplant operations department with headquarters in Akron five years later. He was sent to Europe for several months in 1939 to make a study of plants with which the company had associations and in 1940 made a similar survey of plants in South America. In 1941 he was sent to Los Angeles as factory manager of the company's plant there, but was returned to Akron a short time later to head the deicer and fuel cell division.

Harlan L. Trumbull, director of synthetic rubber and textile research of the Goodrich company, will serve as manager of the research and development division, synthetic rubber department, Rubber Reserve Corp., Washington, D. C. on a temporary basis. In Dr. Trumbull's absence, E. A. Willson will be acting director of synthetic rubber research, and R. A. Crawford acting director of textile research. Dr. Trumbull carried on many government assignments during the critical rubber emergency of the war, at one time devoting nearly eight months to studies on possible development of rubber growing in this country and neighboring countries.

Robert D. Franklin has been appointed manager of the textiles, cotton, advertising, and paper products department of the Goodrich purchasing division, to succeed M. N. Twyman, who has established his own business. A graduate of the Case School of Applied Science, Mr. Franklin joined the company in 1927 as a time study engineer in the industrial products division, later was assigned to special industrial engineering problems, was manager of the specifications department and package engineer in the division, and was transferred to the purchasing division in 1931, as buyer of paper and paper products, office equipment and supplies for three years, buyer of advertising materials from 1934 to 1939, and since 1939 buyer of textiles.

John H. Seaton has been named manager of the aeronautical manufacturing division, formerly known as the deicer and fuel cell division at Goodrich. A graduate of Ohio Northern University in mechanical engineering, Mr. Seaton began his company career in the physical testing laboratories in 1927. Transferred to the industrial products division the same year, he served on various technical assignments and had been the division's chief design engineer since 1942.

Harry E. Keller, general manager of Goodrich's associated lines tire and accessory sales division for the last 20 years, has retired from active business after nearly 43 years with the organization, and Chester E. Carroll

J. E. Gulick

has been named his successor. Mr. Carroll had, since 1935, been assistant general manager of the division, which handles the merchandising of the company's Brunswick, Diamond, Hood, and Miller brands of tires, tubes, accessories, and repair materials. He had joined Goodrich as a Chicago district salesman in 1918 and a year later was made Chicago district manager for Diamond tire sales. He became assistant national sales manager for Diamond tires and mechanical goods in 1923; national manager of Diamond tire sales three years later and in 1927 was named western district manager for the associated lines.

E. C. Shingleton has rejoined the Goodrich advertising and sales promotion department after nearly 42 months in the Armed Services. He will handle sales promotion programs on truck, farm, off-the-road, and industrial tires and tubes. A graduate of Ohio University, he joined Goodrich in 1937 and after sales promotion work in the field was brought to the company's principal offices in Akron in 1938. He held a number of advertising and sales promotion posts before entering the army.

John D. Mann, former director of automotive rationing for OPA, has rejoined Goodrich. Mr. Mann first joined Goodrich as a member of one of the sign truck crews in 1929 and later served as store manager and retail store supervisor in the Albany district and store manager in the Omaha district. Manager of the Goodrich Store in Lincoln, Nebr., in 1942, when he was named to head OPA activities in that city, Mr. Mann soon afterward was selected to direct all government rationing programs for Nebraska. His outstanding record there brought him to Washington in 1944 in charge of all tire rationing, and early this year he was promoted to head the entire automotive rationing program.

T. G. Graham, Goodrich vice president, recently completed 20 years with the company.

Key personnel who will direct construction of the new plastics processing plant which Goodrich is building near Marietta follow. William B. Thompson, with the company since 1925 and since 1941 maintenance engineer at the Lone Star Ordnance plant, is field engineer with headquarters at the site. G. M. Wood, field construction superintendent, engineering division, who joined Goodrich in 1928, will handle construction problems in the company's Akron offices.

Work on field offices and warehouses is under way, and specifications are out for bids on the grading and other work on the plant's rail connections with the Baltimore & Ohio railroad.

Located on 66 acres along the Muskingum River, the new plant will have a main building with 112,000 square feet of floor space, and auxiliary and service structures with an additional 48,000 square feet. The plant will cost approximately \$4,000,000. When in operation it will employ about 250. The company's investment will represent at least \$16,000 for each job created. Only a small staff of technical and supervisory personnel will be transferred to the Marietta plant when it is completed.

Koroseal beverage tubing is again being produced in large quantities, with prompt deliveries to all parts of the nation, according to L. H. Chenowith, plastic products sales manager. A postwar innovation in this field, in addition to the time-tried Black Firepolish finish, is Flametone translucent Koroseal tubing through which the flow of the beverage is plainly visible. The Koroseal tubing is in use in breweries, soft drink bottling plants, and wineries because of its inertness toward the beverages, its flexibility, and its resistance to sunlight, strong corrosives, water, oxidation, and deterioration in the presence of certain oils and solvents. Hedeman Products, Inc., New York, N. Y., is the exclusive distributer of non-toxic beverage tubing for Goodrich.

Dayton Rubber Mfg. Co., Dayton 1, has appointed L. B. Gordon to the new position of director of engineering. This groups all plant, electrical, power, and efficiency engineering as well as machine design and plant layout in one division. Mr. Gordon takes his new position with a broad background in electrical and mechanical engineering and production, having held the position of director of engineering with one of the major rubber companies for more than 20 years. He is credited with several important innovations and developments in the processing of rubber and on plant layout and maintenance. He received his degree in electrical and mechanical engineering at Virginia Polytechnic Institute.

In keeping with the company's postwar plans to enlarge its export operations, the Dayton Rubber Export Co. has been formed as a separate division of Dayton Rubber Mfg. Co. to establish and distribute Dayton Rubber products throughout the world. The new company will be directed by Emerick L. Hollowell, vice president and managing director. Mr. Hollowell, formerly a colonel in the Army General Staff Corps, is a graduate of the Columbia University Law School and has had both wholesale and retail experience with Goodyear, Firestone, and the Pennsylvania Rubber companies where he served 14 years prior to entering the Army.

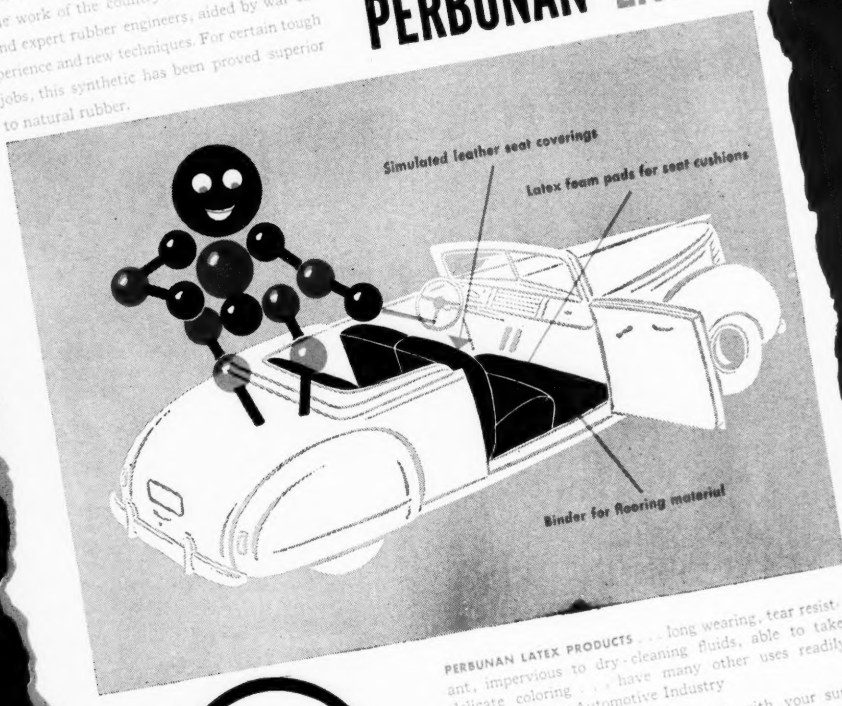
RUBBER MANUFACTURERS! Perbunan Latex is helping you sell to the Automotive Industry!

Here is one of a series of ads that we've pointed at the Automotive Industry. There'll be more . . . all helping you sell rubber products *made with Perbunan Latex.*

Here's a picture of a good combination

It was for the Automotive Industry that this newest Perbunan polymer was developed . . . the work of the country's top research men, and expert rubber engineers, aided by war experience and new techniques. For certain tough jobs, this synthetic has been proved superior to natural rubber.

MODERN CAR AND PERBUNAN LATEX



PERBUNAN LATEX PRODUCTS . . . long wearing, tear resistant, impervious to dry-cleaning fluids, able to take delicate coloring . . . have many other uses readily adaptable to the Automotive Industry

SPECIFY PERBUNAN LATEX . . . discuss it with your supplier of latex products. Call in our engineers to help with your tough rubber problems.

PERBUNAN

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

STANCO DISTRIBUTORS, INC. 26 Broadway, New York 4, N. Y.; First Central Tower, 106 South Main Street, Akron 8, Ohio; 75 East Wacker Drive, Chicago 1, Illinois. West Coast Representatives —H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California.

For the high quality rubber products demanded for the modern automobile, insist on Perbunan. It's been proved superior to natural rubber for many uses. Contact the nearest Stanco Distributors Office for help on any tough rubber compounding problem you may have.

Hoover, Brandt Advanced

Two promotions in the sales organization of B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, follow: John R. Hoover, general sales manager of plastic materials, has been elected vice president in charge of sales, and Allyn I. Brandt, general sales manager of rubber chemicals, becomes general sales manager of all chemical company products sold domestically.

Mr. Hoover will direct both domestic and foreign sales as well as advertising and promotion on Geon polyvinyl plastics, resins, and latices; Hycar nitrile-type synthetic rubbers; Kriston thermosetting plastics; Philadelphia reclaimed rubber; rubber chemicals; organic chemicals, and other products the company develops. Graduated from Harvard in 1925 with a B.S. in chemistry, Mr. Hoover joined The B. F. Goodrich Co., Akron, as a general laboratories chemist. Transferred to the footwear division as a compounder in 1926, he was soon afterward placed in charge of tennis shoe manufacturing. He became manager of the general chemical laboratories in 1930 and in 1932 was made assistant sales manager of tank linings, later becoming sales manager. Then in 1942 he was named manager of plastics sales and in 1943, when the company's chemical division was formed, general sales manager of plastic materials, retaining that title when the chemical division was reorganized as B. F. Goodrich Chemical Co. For the last year Mr. Hoover has been vice president of Plastic Materials Manufacturers Association, Inc., and is a member of the Society of the Plastics Industry, Society of Plastics Engineers, American Institute of Chemical Engineers, Chemists' Club of New York, and Cleveland Athletic Club.

Mr. Brandt, a graduate of Case School of Applied Sciences in Cleveland, joined Goodrich in Akron in 1930 as technical assistant to the vice president in charge of the industrial products division. Assigned to reclaimed rubber sales in 1931, Mr. Brandt was made vice president in charge of sales of The Philadelphia Rubber Works Co., Goodrich's reclaimed rubber subsidiary, in 1940. He served in that capacity, as well as general sales manager of rubber chemicals, when Goodrich Chemical was formed. Mr. Brandt is a past president of the Rubber Reclaimers' Association, Inc., and has long been a director and member of the executive committee. He has also been active in the American Chemical Society and local rubber groups throughout the country and served on various rubber program advisory committees in Washington during the war.

Organization of British Geon, Ltd., for the manufacture of plastic materials and copolymers in the United Kingdom —by Goodrich Chemical and Distillers Co., Ltd., of England—was announced February 14. The new company, with capitalization of £500,000, will engage in the production and sale of Geon materials in the United Kingdom. Chairman of the board of the new company is Sir Walrond Sinclair, also chairman of the board of British Tire & Rubber Co., Ltd., and a director of The B. F. Goodrich Co. Board members include John L. Collyer, president of B. F. Goodrich; W. S. Richardson, president of Goodrich Chemical; L. A. Elgood and C. G. Hayman, members of the board of Distillers Co.; C. J. P. Ball, managing director of F. A. Hughes Co., Ltd.; and H. H. Woolveridge, managing director of British Resin Products, Ltd.

John R. Hoover

Allyn I. Brandt

Industrial Rayon Corp., Cleveland, to fill the vacancy on the board caused by the death January 22 of Fred W. A. Vesper has elected Charles W. Carvin a director. He has been vice president of the corporation since 1941 and in charge of sales since 1943. Mr. Carvin joined Industrial Rayon as sales manager in the yarn division in 1937 after 18 years in hosiery and textile manufacturing and sales. He served as a captain in the Air Corps during World War I.

Firestone Tire & Rubber Co., Akron, has announced it is completing plans for construction of a one-story and mezzanine sales and service building at Hillcrest Blvd. and Locust St., Inglewood, Calif. The triangular-shaped structure will be 150 by 153 feet and will cost $50,000.

Roger S. Firestone, relieved from active duty in the Navy on October 15, has been named manager of the new products department of the Firestone company. Formerly president of The Firestone Rubber & Latex Products Co., Fall River, Mass., Mr. Firestone, in his new capacity with the parent company, will have charge of all research and development involving new products to be manufactured by Firestone.

MIDWEST

Heads New Philblack Laboratory

Phillips Petroleum Co., Bartlesville, Okla., has appointed L. G. Mason manager of the new Philblack sales service laboratory, 330 Maiden Lane, Akron, O., which was recently acquired from the Hycar Chemical Co. Mr. Mason, a native of Iowa, graduated in chemical engineering from Iowa State College in 1928 and was employed by The B. F. Goodrich Co. for 14 years. The first seven years were spent in the various units of the raw materials inspection and development department on reclaims, metal parts, and pigments; the last seven years were spent in the compounding department of the tire division on tire and tube compounding and development problems. In July, 1942, Mr. Mason left Goodrich to become assistant chief chemist of Jenkins Brothers, rubber division, Bridgeport, Conn., and in March, 1943, he left Jenkins to take a position as development manager on mechanical rubber goods at Seiberling Rubber Co., Barberton, O.

The laboratory, under Mr. Mason's direction, will be used entirely for development work in Philblack and to furnish aid to customers on their compounding problems. To assist in this work, additional equipment specifically designed for carbon black work will be added to existing facilities.

Long-term research and major compounding and development studies on carbon black will continue to be handled at the Phillips research laboratory at Phillips, Tex. The addition of this regional technical service laboratory in Akron is expected to provide improved and increased services to users of Philblack.

F. N. Bard, owner of Barco Mfg. Co., Not Inc., manufacturer of flexible joints, 1810 Winnemac Ave., Chicago 40, Ill., in addressing a group of Barco distributers at the Edgewater Beach Hotel, Chicago, during the recent convention of the Associated Equipment Distributors, urged his audience to ask their Congressmen to pass legislation exempting capital goods from price control because purchasers of capital goods have purchasing agents, statistics, and facts upon which to make their purchases, and they have to make a profit on their operations; therefore they are able to take care of themselves and do not need any control.

CUTS MILLING-TIME *15%*

SUN RUBBER-PROCESSING AID . . .

Used by Hose-Manufacturer for Faster Milling

A prominent manufacturer of special-duty hoses could not get the desired softness when milling Neoprene and pure gum rubber. He was using competitive processing oils as softeners. Shore Durometer hardness of under 25 was desirable, but not possible to obtain.

After consulting with a Sun Engineer, he switched to Sun's Circo Light Process Oil, and for two years has been able to obtain a Shore hardness of 20 and lower with the physical properties satisfactorily maintained. Milling-time has been cut by as much as 15%.

No blooming, or migrating, has been experienced, indicating the complete compatibility of Circo Light with the rubbers used.

For Neoprene, for natural rubber, for Buna-S, Hycar, or other synthetics, Sun technologists have developed remarkable processing aids that permit faster processing, better finished products. Call the Sun Engineer near you, and put the Sun experience and know-how to work in your plant today.

SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas

SUN
SUNOCO
INDUSTRIAL PRODUCTS

Glycerized Liquid Lubricant

Glycerized Liquid Lubricant (Concentrate), made by the rubber materials division, Genseke Bros., W. 48th Pl. and Whipple St., Chicago, Ill., is a neutral and non-contaminating versatile lubricant suitable for use with all types of synthetic rubbers as well as natural rubber, reclaim, and mixtures thereof. When it is used as a lubricant in extruding, submerging the tubing in a 10 to 20% solution of the lubricant enables the extrusions to be stacked without adhesion and prevents sticking when the tubing is coiled for flat pan vulcanization.

Glycerized Lubricant can be used to replace mica in the lubrication of airbags in tire production. It also facilitates lubrication of belt drums, allowing ready removal of sleeve from the drum after open steam vulcanization. It is an excellent mandrel and core lubricant and gives easy stripping of the hose or tubing, according to the manufacturer. The lubricant will also act as an air seal upon installation of the hose. For such use in mandrels and cores the Concentrate is used without dilution and is brushed or sprayed on the mandrel. When the Concentrate is used as a mold lubricant, articles are said to be released with ease and retain a desirable gloss. Recommended proportions are from five to 10 ounces a gallon of water.

Inner tubes, automotive parts, and other molded and extruded rubber goods are washed and finished readily with a 3% to 5% aqueous solution which cleans thoroughly and gives a glossy, satiny finish to the products. The lubricant can also be used as an aid in the processing of insulated wire and cable when high heat resistant properties are required.

In addition to its uses as a lubricant, Glycerized Liquid in water solution can be used to coat hot rubber slabs in place of soapstone or talc to remove all stickiness. A 3% to 5% solution is generally used although very soft or tacky stocks may require a somewhat greater concentration.

Fred J. Bowman, vice president, Wilson Sporting Goods Co., Chicago, Ill., recently stated that in consequence of recent CPA action, only synthetic rubber golf balls will be available for the next six months. Uncertainty of the natural rubber situation led the government agency to rescind its recent order granting allocations of natural rubber for golf ball manufacture. Rubber thread manufacturers have been allowed unlimited supplies of neoprene for golf balls.

Ideal Commutator Dresser Co., manufacturer of electrical and mechanical equipment for all industries, Sycamore, Ill., owing to its steady, long-term growth and better to provide for further expansion now under way, on February 1 changed to a corporation known as Ideal Industries, Inc. As of the same date, Ideal Commutator Dresser Co., a partnership, was terminated. No changes, however, have been made in management, personnel, location, manufacturing, distribution, or other policies of the company.

Associated Engineers, Inc., 230 E. Berry St., Fort Wayne, Ind., has added to its staff Fred L. Tanner and Frank M. Williams. Mr. Tanner, as technical consultant, will travel out of the main office, specializing in all phases of electrical engineering, power plant engineering, and plant layouts and will also work with public utility companies and make property and equipment appraisals. Mr. Tanner has had broad experience in the electrical engineering and public utility fields. Mr. Williams rejoins Associated Engineers as account executive after several years as a colonel in the department of supply and maintenance, Army Air Forces. He first came to the company in 1937 and now will be a permanent member of the management engineering policy board and will supervise several current assignments.

Monsanto Chemical Co., St. Louis, Mo., last month appointed Sam R. Clement assistant general branch manager of its Birmingham sales district, which comprises the southeastern states and has headquarters at Birmingham, Ala. A native of Atlanta, Mr. Clement was graduated in 1926 from the Georgia School of Technology. He has been the company's resident salesman at Atlanta since 1935. Previously, from 1931 until its acquisition by Monsanto in 1935, he was Atlanta salesman for the Swann Chemical Co. G. Y. Frankle is general branch manager of the Birmingham sales district, which handles products of all Monsanto divisions.

The Union Pacific Railroad, Omaha, Neb., is advertising during 1946 in more than 100 trade publications representing 72 different industries. The theme of the advertisements is "A Salute to American Industry," the copy having a distinct freight solicitation flavor. The decision to inaugurate this advertising campaign came after the conclusion of the railroad's series of radio shows entitled "Your America." In a section of each of the weekly radio programs leading industrialists and businessmen told a nationwide audience about their industry and its plans for the future. Warren S. Lockwood, vice president of The Rubber Manufacturers' Association, Inc., was guest speaker on one of these programs. The trade publication advertising campaign is an effort to continue the spirit of cooperation and understanding between industry and the railroad which was developed by the radio programs.

Golf Ball, Inc., 5816 S. Lowe Ave., Chicago, Ill., which has modernized its plant and installed new golf manufacturing equipment, has resumed manufacture of Scot golf balls under a new owner, Charles J. Neyens, owner of Dorney Mfg. Co., manufacturer of rubber grinding wheels in Chicago. Personnel of the prewar Golf Ball, Inc., has been retained, including Philip Kalowski, superintendent in charge of production.

Gates Rubber Co., Denver, Colo., will erect a four-story laboratory building at its plant. The steel frame and brick structure will be 100 by 300 feet.

NEW ENGLAND

Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass., in recognition of the fact that during the coming year the bulk handling of carbon black by rubber manufacturers will be increased considerably, will add 20 new tank cars to the CABX fleet during the second quarter of this year. The Cabot company pioneered in the tank car field in June, 1933, when it designed and introduced the first car for bulk shipment of Spheron carbon black from its plants direct to tire factories. That was an innovation which has been adopted throughout the industry since then, and now, with the additions effected by this new order, Cabot will have a fleet of 106 cars on the rails, serving rubber manufacturers. Receiving installations for the handling of carbon black in bulk have increased considerably. There will be 37 rubber manfacturing plants with such equipment in 1946, according to a recent report by the Carbon Black Pool Authority. Cabot has placed the order for the new tank cars to meet the increased needs of rubber plants which are equipped with facilities for handling their black in bulk.

Otto Eskens, representative in ten European countries for the Cabot company, in February arrived in Boston for a month's stay to renew business associations in the United States which were broken off by the German occupation of Holland. He will also visit the Texas Panhandle to inspect Cabot carbon black plants there. Mr. Eskens, who has headquarters in Amsterdam, is the agent for Cabot carbon black and other Cabot raw materials in Holland, Germany, Austria, Hungary, Switzerland, Czechoslovakia, Poland, Latvia, Lithuania, and Esthonia. He was in Amsterdam when the Germans arrived on May 10, 1940, and beginning in May, 1942, spent almost a year in a prison camp as a hostage.

New England Sportsmen's & Boat Show took place February 2 to 10 in the Mechanics Bldg., Boston, Mass. Among the firms with displays were Hodgman Rubber Co. and New York Rubber Corp.

The Stanley Chemical Co., East Berlin, Conn., through President W. J. Kerin, announced the apointment of L. S. Knouse as sales manager, with complete responsibility for all industrial coatings. Born in Denver, Colo., in 1907, Mr. Knouse graduated from Pomona College, Claremont, Calif., in 1929 and immediately became associated with The Stanley Works, New Britain, Conn. In 1931 he became a member of the sales and marketing research division, traveling extensively and determining the marketability of the company's products as well as working on sales and distribution. In 1939 he was made sales manager of an affiliated company and in 1941 returned to the ordnance hardware sales division of The Stanley Works.

Starts New Coatings Firm

Formation of a new corporation to manufacture and sell specialized industrial coatings, lacquers, and technical finishes was completed February 1 by Edward H. Christ, of New Brittain, Conn., who has resigned as vice president, general sales manager, and a director of the Stanley Chemical Co., East Berlin, Conn. The new company, Chemical Coating Corp., will have general offices in New Britain. A new plant to fabricate the materials is planned for this locality immediately. The corporation has a capital stock of $200,000 and starts business with $100,000 paid in, according to incorporation papers filed with the Secretary of State.

Officers elected at the incorporation meeting are: president, Mr. Christ; vice presidents, S. K. Hopkins and Edward D. Sechrest; secretary-treasurer, John J. Banninga. Directors will be the officers and Frank J. Wachter and J. Lindsay Muir.

Mr. Christ was educated at Renssalaer Polytechnic Institute and was for four years Connecticut representative of A. P. Munning & Co., Matawan, N. J. For the past twenty years he was with Stanley Chemical Co. He is also a member of the New Britain Board of Education and formerly served on the Common Council. He was a founder and the first president of the Exchange Club of New Britain and a member of the Shuttle Meadow Club and New Britain Club.

The Norwalk Tire & Rubber Co., Norwalk, Conn., recently held its annual stockholders' meeting at which all directors were reelected as follows: Spencer S. Adams, John Cavanagh, Joseph N. Cieri, Harry C. Miller, Warren A. Schenck, Harry G. Schmidt, and John W. Whitehead. At the directors' meeting which followed, officers also were reelected: president, Mr. Whitehead; second vice president, George D. Kratz; treasurer, Mr. Cieri; secretary, Mr. Miller; assistant secretary, James W. Webb.

General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass., has announced the return to its organization as plant manager of Chester A. Brown, for the past three years associated with the Baytown, Tex., Rubber Reserve synthetic rubber plant, operated by The General Tire & Rubber Co., Akron, O., with General Latex as associate. Mr. Brown was assistant general manager of the Baytown plant at the time of his transfer to General Latex.

OBITUARY

Tor Ake Tengwall

WORD has been received of the death on January 19 from a heart attack of Tor Ake Tengwall, for the past two years adviser on rubber for the Board for the Netherlands Indies, Surinam, and Curacao. He had previously served in the following capacities: a director of the Institute for Tropical Agriculture, Antalya, Turkey; vice president, Experiment Station, Buitenzorg, West Java; director of the research department, Firestone Plantation Co. in Liberia; and agricultural inspector, Sugar Research Station, Pasaroean, Java.

The deceased, who was born May 8, 1892, in Ornskoldwik, Sweden, attended universities at Upsala, Sweden, and Utrecht, Holland, and received the following degrees, B.S.C., M.A., M.S.C., and Ph.D.

Philip H. Ober

PHILIP H. OBER, senior vice president and a director of The Mansfield Tire & Rubber Co., Mansfield, O., died at his home in Mansfield on February 1 from complications resulting from a fall. Mr. Ober, who was born July 30, 1866, in Baltimore, Mr., was a veteran of 49 years in the rubber industry, 30 of them with Mansfield Tire & Rubber. He joined the organization in 1916 as factory manager and became vice president and assistant general manager in 1923. Mr. Ober began his career in the rubber industry with the Hartford Rubber Co., Hartford, Conn. Later he was associated with the Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada, the Fisk Tire & Rubber Co., Chicopee Falls, Mass., and then the Federal Rubber Co. The deceased was active in the Boy Scout movement, Y. M. C. A. activities, Masonic circles, and the Mansfield Chamber of Commerce.

Funeral services were conducted at the Central Methodist Church on February 4. The remains were placed in the mausoleum at Mansfield Cemetery.

Mr. Ober is survived by his widow, a sister, and a brother.

F. W. Strong

FREDERICK W. STRONG, former general manager of distributing branches of United States Rubber Co., New York, N. Y., died at his home in Kew Gardens, L. I., N. Y., February 13, after a short illness. He had been associated with the rubber company for 44 years. In November, 1945, he had asked to be relieved of active duty because of poor health and since that time had been acting in an advisory capacity to the manager of distributing branches.

Mr. Strong was born in Brooklyn, N. Y., July 1, 1886. He started work with the rubber company in 1902 as a traveling auditor. In 1923 he became assistant financial manager of sales with headquarters in New York and two years later was made financial manager of sales. In 1929 he was appointed assistant general manager of distributing branches and in 1934 was made general manager of distributing branches.

Mr. Strong is survived by his wife, a daughter, three grandchildren, a sister, and a brother.

Funeral services were held February 16 in Richmond Hill, N. Y. Interment was in Maple Grove Cemetery, Kew Gardens.

H. A. Everlien

HERMAN A. EVERLIEN, general sales manager of the mechanical goods division of United States Rubber Co., New York, N. Y., died suddenly of a cerebral hemorrhage February 21 at his home in New York. Mr. Everlien had been associated with the rubber industry for 43 years. He began his career as a clerk in the Chicago office of the Revere Rubber Co., a firm later consolidated into the U. S. Rubber organization. He rose through various clerical and sales positions to become mechanical goods sales manager of the Pittsburgh district in 1920. Four years later he was transferred to the company's general offices in New York to take charge of mechanical goods branch sales, and in 1944 he was appointed general sales manager of this division.

He is survived by his wife, a brother, a sister, and a stepson.

Funeral services were held in New York and Cicero, Ill., with interment in Berwyn, Ill.

A. R. Haley

ARTHUR R. HALEY, general manager of the Pittsburgh Plate Glass Co., Columbia Cement Division, died at his Zanesville, O. home on February 14 from a heart attack. He had been with the firm since January 1, 1941. Previously he had served as president and general manager of the J. P. Loomis Coal & Supply Co.

He was past president of the Akron Chamber of Commerce, a well-known athlete, an alumnus of Akron University, and a veteran of World War 1.

Kenneth E. Burgess

KENNETH E. BURGESS, director of technical research, Columbian Carbon Co., Magnetic Pigment division, died in Philadelphia, Pa., February 10. Born in Burgessville, Ont., Canada, 56 years ago, he took graduate and post-graduate degrees in chemistry at the University of Toronto. Then followed production of explosives for E. I. du Pont de Nemours & Co., Inc., and later protective coating development and manufacture for the Zapon division of Atlas Powder Co. The deceased then joined the Van Schaack Chemical Co., later absorbed by the Ault & Wiborg division of Interchemical Corp.

For 12 years Mr. Burgess directed the technical research program for Magnetic Pigment Co. During the war he was active in the development of Federal Pigment Specifications for camouflage and other military purposes. He was a member of American Institute of Chemical Engineers, American Institute of Chemists, the American Chemical Society, the Chemists Club, and the Trenton Country Club. Mr. Burgess was widely known throughout the paint industry. His lectures before Paint Production clubs were very popular.

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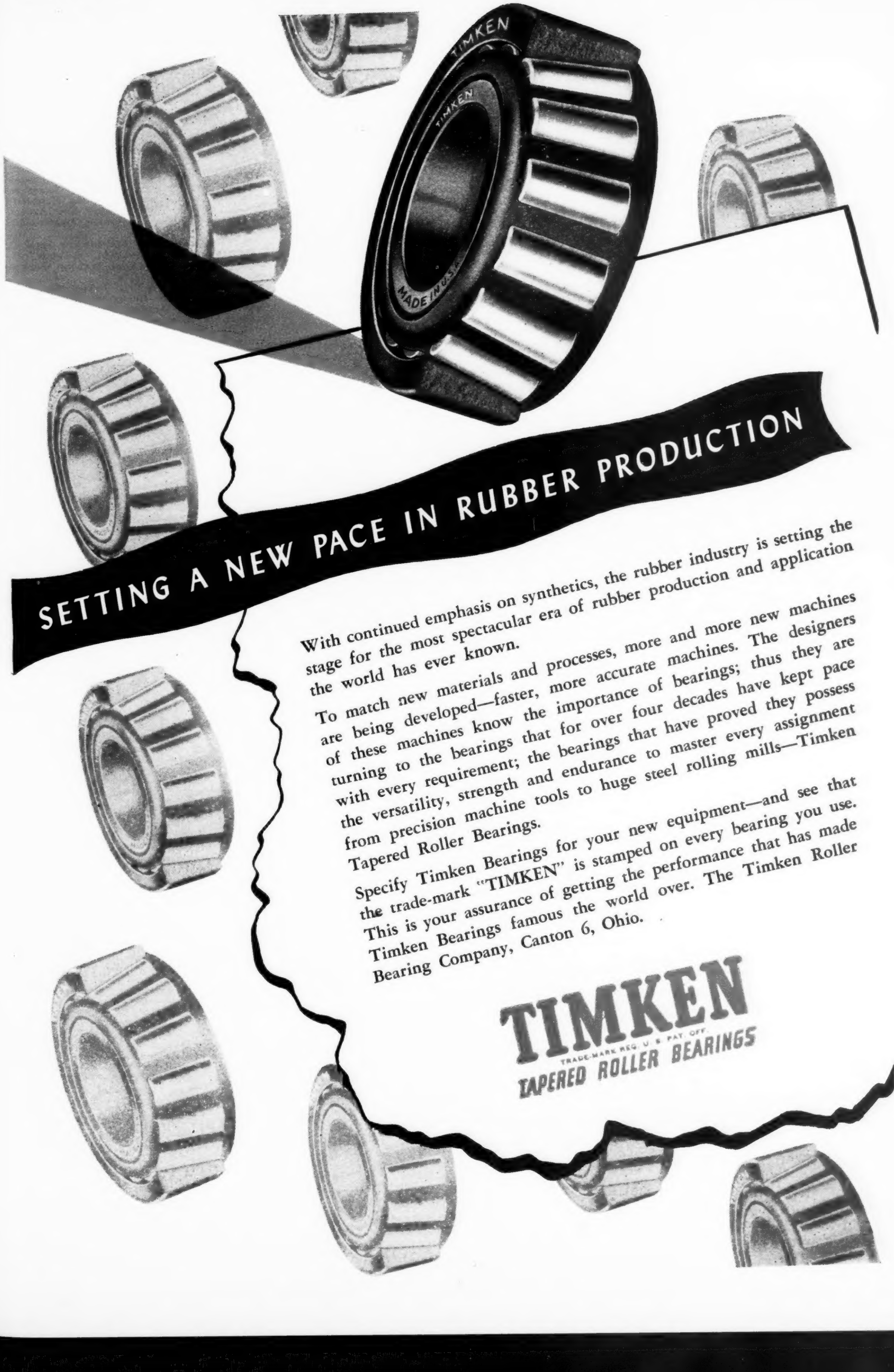
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With continued emphasis on synthetics, the rubber industry is setting the stage for the most spectacular era of rubber production and application the world has ever known.
To match new materials and processes, more and more new machines are being developed—faster, more accurate machines. The designers of these machines know the importance of bearings; thus they are turning to the bearings that for over four decades have kept pace with every requirement; the bearings that have proved they possess the versatility, strength and endurance to master every assignment from precision machine tools to huge steel rolling mills—Timken Tapered Roller Bearings.
Specify Timken Bearings for your new equipment—and see that the trade-mark "TIMKEN" is stamped on every bearing you use. This is your assurance of getting the performance that has made Timken Bearings famous the world over. The Timken Roller Bearing Company, Canton 6, Ohio.
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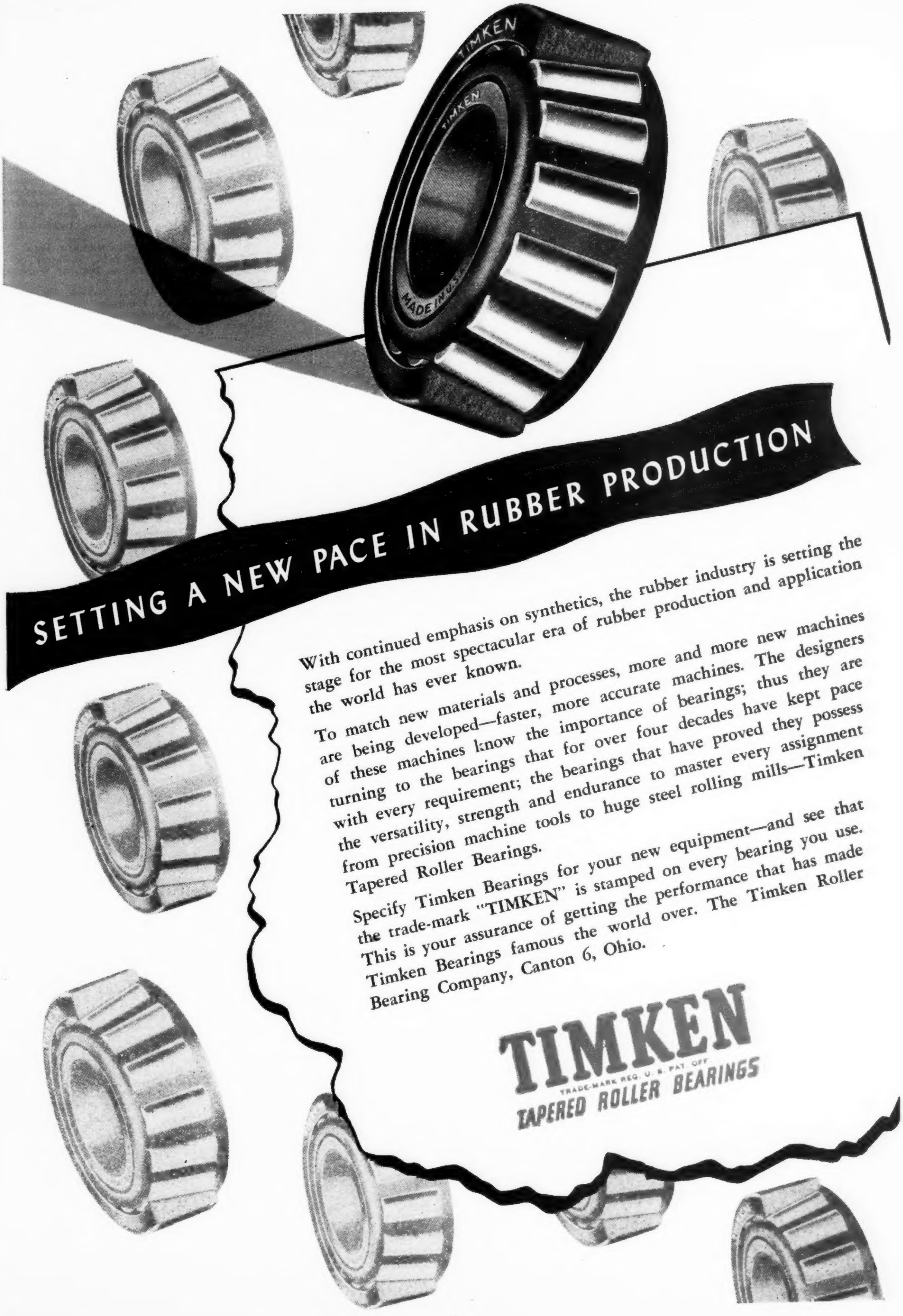
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Specify Timken Bearings for your new equipment—and see that the trade-mark "TIMKEN" is stamped on every bearing you use. This is your assurance of getting the performance that has made Timken Bearings famous the world over. The Timken Roller Bearing Company, Canton 6, Ohio.
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Patents and Trade Marks

APPLICATION

United States

2,390,537. **In Apparatus for Dimpling Metal Plate, Including a Tubular Casing and an Axially Movable Tubular Member on the Casing through Which a Tool Extends, a Resilient Rubber Bushing Fastened on the Outer End of the Axially Moving Member.** L. C. Huck, Grosse Pointe Shores, assignor, by mesne assignments, to Huxon Holding Corp., Detroit, both in Mich.

2,390,561. **In a Closure Element for a Glass Container, a Sealing Layer of Cellular Plastic.** J. P. Staples, Mount Lebanon, assignor to Pittsburgh Corning Corp., Allegheny County, both in Pa.

2,390,565. **Garment Protector.** D. Topjian, Watertown, Mass., assignor, by mesne assignments, to himself, as trustee.

2,390,684. **In a Veneer Press, a Pressure Bag Adapted to Receive Heating and Cooling Fluid under Pressure Separately.** V. Bendix, South Bend, Ind., assignor, by mesne assignments, to Langley Aviation Corp., New York, N. Y.

2,390,803. **Movable Rubber Die Member in a Die Set for Producing Flanged Plastic Parts.** C. F. Marschner, Normandy, assignor to McDonnell Aircraft Corp., St. Louis, both in Mo.

2,390,820. **A Bushing for a Spark Plug Unit Including a Rigid Tubular Insulating Boot and a Resilient Insulating Sleeve Extending into the Boot and Intimately Bonded to the Inner Surface thereof.** T. N. Wilcox, Pittsfield, Mass., and H. H. Race, Schenectady, N. Y., assignors to General Electric Co., a corporation of N. Y.

2,390,861. **Non-Collapsible Nipple.** E. L. Younkins, South Nyack, N. Y.

2,390,905. **In an Oscillating Joint Having an Outer Tubular Metallic Sleeve Member within Which Fits an Inner Metallic Member, a Rubber-Like Bushing between the Members.** H. E. Wening and R. E. Moule, both in Dayton, O., assignors to General Motors Corp., Detroit, Mich.

2,390,921. **Facial Cream Applicator.** J. W. Clark, assignor of one-third to E. H. Clark, both of Washington, D. C.

2,390,928. **Radially Yieldable Sealing Structure for Apertures for the Passage of Control Element through the Wall of an Enclosed Space Maintained at Superatmospheric Pressure.** B. E. Del Mar, West Los Angeles, and E. E. Van Dyke, Van Nuys, assignors to Douglas Aircraft Co., Inc., Santa Monica, all in Calif.

2,390,955. **Fire Escape Having an Inflatable Bag.** A. E. McDonnell, Memphis, Tenn.

2,391,007. **Fluid Seal Including an Annular Backing Ring and an Annular Body of Resilient Material Non-Rotatably Secured to the Ring.** L. R. Buckendale, assignor to Timken-Detroit Axle Co., both of Detroit, Mich.

2,391,038. **Inductance Device Including a Helical Coil of Conductive Material Having a Given Thermal Coefficient of Expansion, and a Solid, Resilient Insulating Material Surrounding the Turns of the Coil; the Insulating Material Has a Greater Thermal Coefficient of Expansion Than the Conductive Material.** C. M. Rifenbergh, New York, N. Y., assignor to Federal Telephone & Radio Corp., Newark, N. J.

2,391,063. **In a Hose Coupling Including Two Ported Members Adapted to Form a Seal, a Soft Elastic Nipple Projecting from an End Portion of One of the Members.** P. S. Madsen, Bethany, assignor to Seamless Rubber Co., New Haven, both in Conn.

2,391,077. **Use of a Thermoplastic in Making Brushes.** O. W. Sticht, Orange, N. J.

2,391,106. **Plastic Resin for Artificial Teeth.** J. A. Saffir, Chicago, Ill., assignor to Dentists' Supply Co. of New York, New York, N. Y.

2,391,241. **Elastic Sheet with Spanwise Attaching Margins as Protective Covering for the Leading Edge of an Airfoil.** W. H. Hunter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,391,282. **Tubular Body of Flexible, Plastic Material Reenforced with Circumferentially Arranged Cord to Limit Circumferential Expansion and Two Inextensible Tension Members Extending Longitudinally of the Tubular Body to Limit Longitudinal Expansion of the Body When Inflated.** W. T. Van Orman, assignor to Wingfoot Corp., both of Akron, O.

2,391,326. **For Aircraft or the Like, a Float Including a Non-Rigid, Inflatable Bag.** A. C. McKinley, Huntington, assignor to McKinley Pneumatic Floats, Inc., Garden City, both in L. I., N. Y.

2,391,343. **Deformable Diaphragm as Vaginal Obturator.** O. Popper, Johannesburg, Transvaal, Union of South Africa.

2,391,446. **For Footwear, Molded Counter Employing Fiberboard Coated with Thermoplastic Material.** E. A. Cohen, Stoneham, Mass.

2,391,475. **Waterfowl Decoy with a Hollow Body of Material Such as Soft Rubber.** J. P. Newhardt, Berwyn, assignor of one-half to Charles H. Angell, Danville, both in Ill.

2,391,477. **Fuel Tank Consisting of an Inner Layer of Fabric Impregnated with a Butadiene Polymer, and a Layer of Cattle Hide, a Layer of Shock-Absorbing Sponge Rubber, a Layer of Crude Rubber, and an Outer Layer of Chrome-Tanned Cattle Hide.** E. C. Phillips, Dayton, O.

2,391,524. **In a Track Construction Including Track Members Having Male and Female Hinge Members, Separate Sleeves Resiliently Mounted in Each Hinge Member on Rubber Bushings.** C. E. Sorensen, Detroit, and L. S. Sheldrick, assignors to Ford Motor Co., both of Dearborn, both in Mich.

2,391,553. **In Combination, an Impact Receiving Shank for a Power Hammer Bit and a Directing Handle for the Bit; the Handle Has a Ring Portion Encircling the Shank and Consisting of two Rings, One within the Other, and a Rubber Cushion between the Rings.** A. G. Decker, Jr., Baltimore County, Md., assignor to Black & Decker Mfg. Co., a corporation of Md.

2,391,564. **An Outsole Including an Inner Sole-Shaped Member of Porous Material on the Bottom and Edge of Which Is a Layer of Fabric Including Fibrous and Thermoset Material, and an Outer Coating of Waterproof Material on the Sole.** J. Gregg, New Hope, Pa.

2,391,579. **Resilient Tire Adapted to Be Mounted as a Unitary Structure on a Vehicle Wheel.** B. B. Levy, Middleboro, Mass.

2,391,605. **In a Flow Device Including a Well Tubing, a Main Valve Element with a Hollow Member Constructed of a Yieldable Material.** R. O. Walton, assignor to Merla Tool Corp., both of Dallas, Tex.

2,391,677. **High Altitude Oxygen Supplying Mask.** A. H. Bulbulain, Rochester, Minn.

2,391,707. **Overboot.** S. J. Jarrell, Norfolk, Va.

2,391,828. **For Use in the Formation of in Situ Concrete Piles, Coffer Dams, Walls, Etc., a Hollow Open-Ended Casing, a Closure Member for One End thereof, and a Connecting Member of Flexible, Water-Impervious Material Releasably Engaging with the Closure Member and Casing to Seal the Latter.** A. Hood, Llanwrda, Wales.

2,391,841. **The Combination of a Wheel Rim, a Pneumatic Tire Casing, and an Expansible Inner Tube Divided into Two Chambers by a Non-Expansible Tube.** B. E. Mendelsohn, Brookline, Mass., assignor, by direct and mesne assignments, 42½% to B. Howard Benson, Boston, Mass., and 15% to I. Fisher, New Haven, Conn.

Dominion of Canada

432,054. **Knitted Slip-Cover Containing Elastic Threads.** J. A. Krasnov, Melrose Park, and M. M. Kuller, Allentown, both in Pa., U.S.A.

432,117. **As Binding Agent, Hardenable Aldehyde Condensation Products of Aminotriazines.** Ciba Products Corp., Dover, Del., U.S.A., assignee of Society of Chemical Industry in Basel, assignee of G. Widmer, both of Basel, and W. Fisch, Muttenz, both in Switzerland.

432,141. **In a Railway Truck Including a Bolster Part, a Bolster Carrying Part, an Elongated Draft Device Terminating at Each End in Opposing Radial Collars Spaced Apart Longitudinally of the Device, and Elements of the Bolster Part and the Bolster Carrying Part Extending between Pairs of the Collars, a Rubber Block between Each of the Collars and the Adjacent Part Element.** General Steel Castings Corp., Eddystone, Pa., assignee of C. E. Tack, Chicago, Ill., both in the U.S.A.

432,144. **Frictional Mechanism for Controlling Relative Rotation of Rotatable Parts. Including a Pair of Concentric Members of Which One Has a Channel in Which Is an Inflatable Expander, and Friction Elements on the Expander.** B. F. Goodrich Co., New York, N. Y., assignee of W. H. Hunter, Lakewood, O., both in the U.S.A.

432,191. **In a Fluid Seal for a Vulcanizing Chamber, Resilient Diaphragms, of Which the One in Contact with the Steam Is of Polymerized Chloroprene.** Western Electric Co., Inc., New York, N. Y., assignee of T. K. Cox, Randallstown, Md., both in the U.S.A.

432,199. **Anti-Skid Tire.** Wingfoot Corp., assignee of C. J. Burkley, both of Akron, O., U.S.A.

432,202. **Ice Cube Tray of Molded Plastic Flexible Material.** J. A. and J. P. Gits, assignee of one-half of the interest, both of Chicago, Ill., U.S.A.

432,205. **Brassiere with a Main Cup-Shaped Body Formed throughout of Cellular Latex Rubber.** C. E. Zimmerman, co-inventor with and assignee of J. F. Skold, both of Chicago, Ill., U.S.A.

432,288. **Filter Medium Including Filaments of a Vinyl Resin Resulting from the Conjoint Polymerization of a Vinyl Halide with a Vinyl Ester of an Aliphatic Acid.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of E. W. Rugeley, Charleston, W. Va., U.S.A.

432,291. **Fluid-Operated Expander Including a Body of Rubber-Like Material Enclosing a U-Shaped Inflation Cavity, and a Reenforcing Layer of Fabric Embedded in the Rubber-Like Material.** B. F. Goodrich Co., New York, N. Y., assignee of W. H. Hunter, Lakewood, O., both in the U.S.A.

432,344. **Sealing and Reenforcing Tape.** McLaurin-Jones Co., Brookfield, assignee of L. Davis and E. C. Tuukkanen, both of Worcester, both in Mass., U.S.A.

432,368. **In a Packing Device for Sealing Two Parts Slidably Engaging Each Other, an Annular Sealing Member of Elastic Deformable Material.** J. Mercier, New York, N. Y., U.S.A.

432,372. **Colostomy Irrigation Apron of Impermeable Fabric.** G. Moorhead, Ottawa, Ont.

432,382. **Vacuum Cleaner Conduit Consisting of a Hose of Resilient Material Such as Rubber, and Another Air Conveying Member of Rigid Material.** Aktiebolaget Elektrolux, assignee of L. J. F. Ell, both of Stockholm, Sweden.

432,424. **Sealed Tubular Coupling for Suction Tubes.** P. A. Geir Co., assignee of E. F. Martinet, both of Cleveland, O., U.S.A.

432,467. **Screening Apparatus Including Spaced Metallic Screens and a Soft Rubber Spacing Pad therebetween.** W. S. Tyler Co. of Canada, Ltd., St. Catherines, Ont., assignee of C. E. Jenks, Willoughby, O., U.S.A.

432,470. **In an Airport Fueling System, Delivery Means Including a Flexible, Collapsible Hose.** Wayne Pump Co., assignee of R. J. Jauch and F. W. Sturm, all of Fort Wayne, Ind., U.S.A.

432,485. **Resilient Product Including a Covering of Sponge Rubber of Non-Uniform Thickness Molded on to a Resilient Fibrous Body.** H. G. W. Chichester-Miles, Dunstable, Bedfordshare, and W. O. Street, Bury, Lancashire, both in England.

432,510. **Junction Box with Body and Cover of Resilient Material.** O. A. Windsor, Santa Monica, Calif., U.S.A.

432,581. **Container Consisting of Tube of Waxed Lining Material about Which Is Folded a Sheet of Laminated Paper and Rubber Hydrochloride.** Shellmar Products Co., Mount Vernon, O., assignee of G. A. Moore, New York, N. Y., both in the U.S.A.

432,646. **In an Enclosed Artificial Horizon Including a Platinum Cup, a Polystyrene Holder for the Cup.** Canadian Kodak Co., Ltd., Toronto, Ont., assignee of D. L. Wood, Rochester, N. Y., U.S.A.

432,651. **Pneumatic Tire.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. R. Cuthbertson, Detroit, Mich., U.S.A.

432,652. **Resilient Mounting.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. H. Hile, Riverside, Conn., U.S.A.

432,667. **In a Track for Self-Laying Track Type of Vehicles, an Open-Ended Flexible Band, a Tension Resisting Structure, and Connecting Means Including a Body of Resilient Rubber-Like Material Mounted to Resist Flexure of the Connection by Shear Stress of the Material.** B. F. Goodrich Co., New York, N. Y., assignee of F. L. Haushalter, Akron, O., both in the U.S.A.

432,684-85. **Inner Layer of Transparent Rubber Hydrochloride in Paper Containers.** Shellmar Products Co., Mount Vernon, O., assignee of G. A. Moore, New York, N. Y., U.S.A.

432,724. **Teat Cup Inflation for a Milking Apparatus.** Universal Milking Machine Co., assignee of L. F. Bender, both of Waukesha, Wis., U.S.A.

432,727. **Flexible Hose Pipe Including a Core Consisting of an Inner Tubular Layer of Flexible Synthetic Material, an Inner Layer of Fabric Bonded to the Core, a Surrounding Reenforcing Helix of Regenerated Cellulose Wire, and an Outer Layer of Fabric.** Wilkinson Rubber Linatex, Ltd., assignee of B. Wilkinson, both of London, England.

United Kingdom

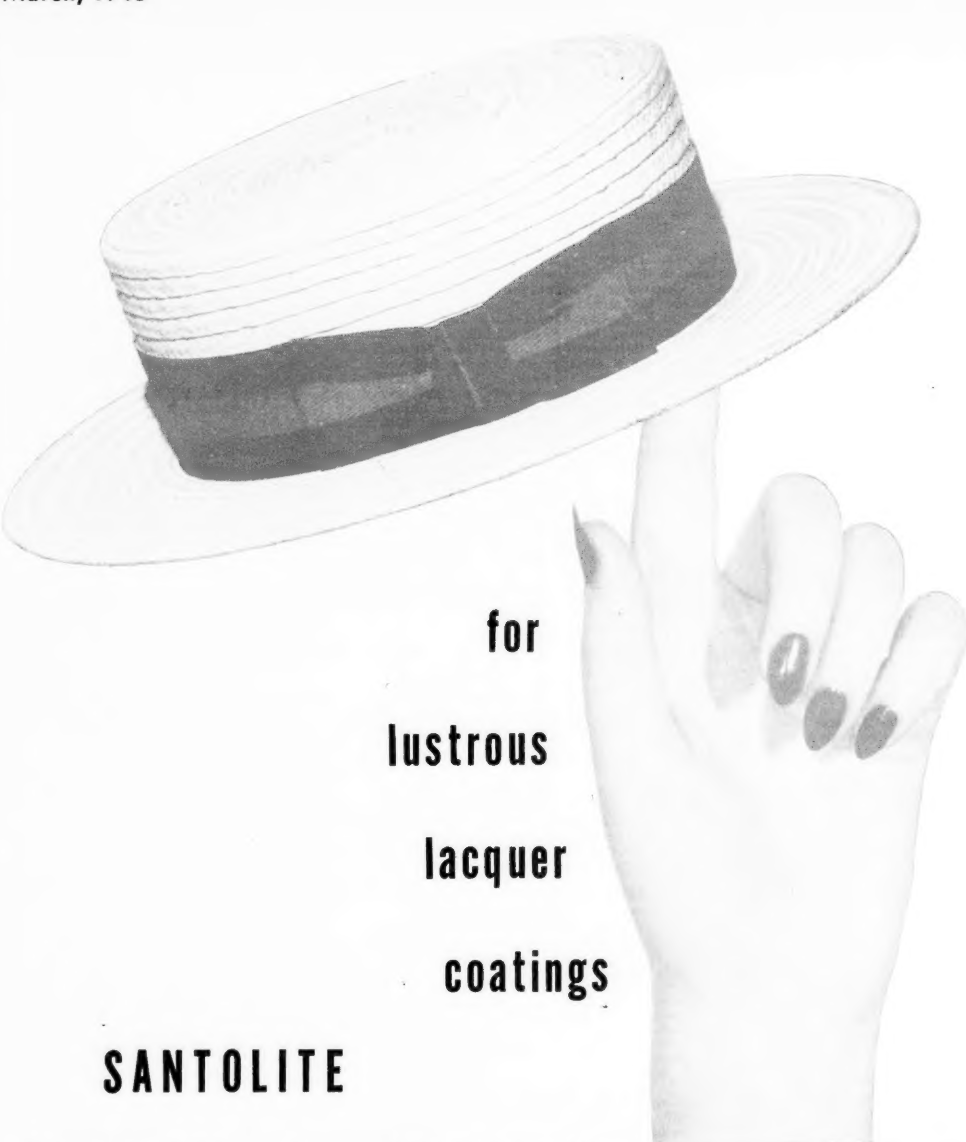
573,397. **Shock Absorbers, Particularly for Parachutes.** L'Aviorex Dreyfus Freres.

573,409. **Waterproof Garments.** Eureka Rubber Co. (Proprietary), Ltd., and G. Isaacs.

573,553. **Power Transmission Device.** Dunlop Rubber Co., Ltd., T. E. H. Gray and H. F. L. Jenkins.

573,684. **Rubber Wheel, More Particularly Intended for Use as Tail Wheel for Aircraft.** W. G. L. Smith.

573,728-29. **Bearings.** Tecalemit, Ltd., and C. C. S. Le Clair.



for lustrous lacquer coatings

SANTOLITE

A straw hat and a woman's lacquered nails are pictured here to highlight a number of important qualities imparted by the Santolites* to lacquer coatings — high gloss, good adhesion, resistance to moisture penetration and hardness.

There are three Monsanto Santolites, each with characteristic qualities that suit them for specific uses. They impart unusual hardening effects to cellulose esters and have special value in increasing the resistance of moisture penetration of cellulose ester compositions. They can be employed in spraying, dipping and brushing lacquers to make clear, colorless coatings of high gloss and good adhesion.

Samples for experimental work will be furnished promptly. Contact the nearest Monsanto Office, or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Cincinnati, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

*Reg. U. S. Pat. Off.

MONSANTO CHEMICALS
SERVING INDUSTRY... WHICH SERVES MANKIND

THE SANTOLITES
Condensation Products of Aromatic Sulfonamides with Formaldehyde
CHARACTERISTICS OF SANTOLITES

	MS-80% SOLN	MHP	K-5
Color and form	Light colored viscous liquids	Hard, nearly colorless resin	Clear, light yellow sticky resin
Specific gravity at 25°C.	1.2098 (Approx.)	1.350 (Approx.)	1.3022 (Approx.)
Refractive Index	1.545 at 25°C. (Approx.)	1.4295 at 25°C. (25% in normal Butyl Acetate) (Approx.)	1.5450 at 50°C. (Approx.)
Solubility	Soluble in practically all organic solvents except petroleum hydrocarbons and varnish oils.		
Retentivity in Cellulose Acetate**	Over 100	Over 100	Over 100
Retentivity in Cellulose Nitrate**	Over 100	Over 100	Over 100
Acid Number	Neutral	Neutral	10 Max.

SANTOLITE MS-80% SOLUTION — Supplied at 80% solids in solution with 20% normal Butyl Acetate also as 100% solids.
**Retentivity is given in parts per 100 parts by weight of the Cellulose Nitrate or Cellulose Acetate.

573,730. **Tires for Vehicle Road Wheels.** Tecalemit, Ltd., and C. C. S. Le Clair.
573,738. **Pads or Treads for Footwear Bottoms.** Dominion Rubber Co., Ltd., and F. McCheyne.
573,758. **Covering Materials for Aircraft Frame Structures.** Ioco Rubber & Waterproofing Co., Ltd., and A. Ryan.
573,838. **Fuel Tanks for Aircraft.** B. Wilkinson and K. M. LeGood.

PROCESS

United States

2,390,821. **Spark Plug Unit Bushings.** T. N. Wilcox, Pittsfield, Mass., assignor to General Electric Co., a corporation of New York.
2,391,489. **Molding Laminated Articles.** A. J. Stamm and H. D. Turner, Madison, Wis., assignors to the United States of America, as represented by the Secretary of Agriculture.

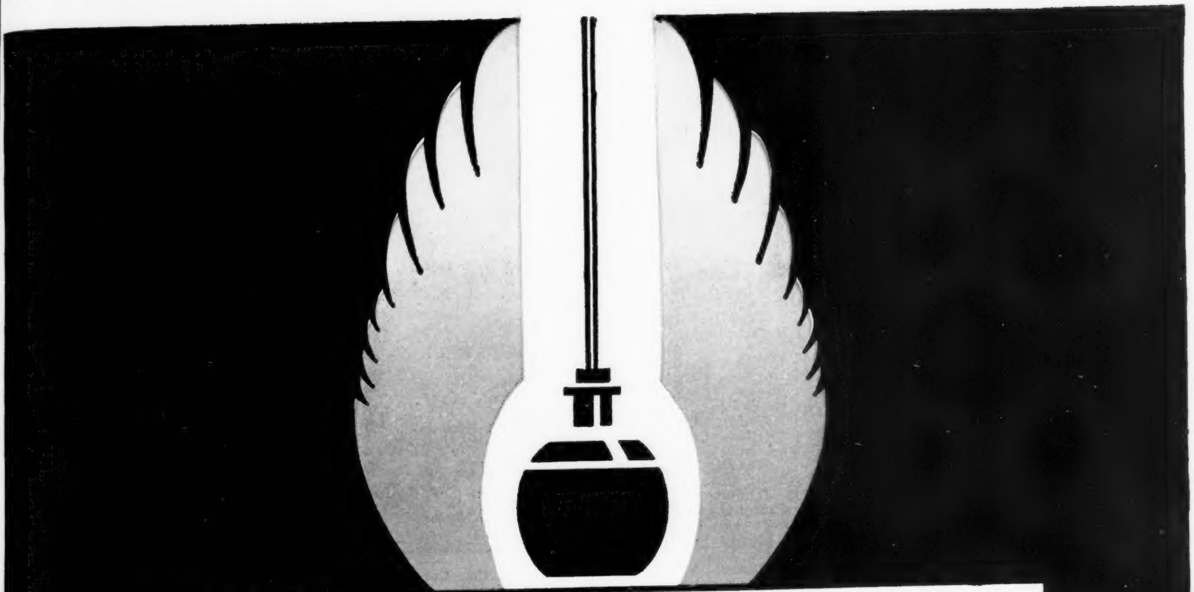
Dominion of Canada

432,198. **Stretching a Thermostretchable Elastoplastic Film.** Wingfoot Corp., Akron, assignee of R. C. Martin, Cuyahoga Falls, both in O., U.S.A.
432,200. **Transmission Belts.** Wingfoot Corp., Akron, assignee of R. S. Carter, Cuyahoga Falls, and M. L. Dorf, Akron, both in O., U.S.A.
432,498. **Sponge Rubber Articles from Aqueous Natural or Artificial Rubber Dispersions.** T. A. TeGrotenhuis, Olmstead Falls, O., U.S.A.
432,554. **Pipes with an External Covering of Rubberized Fabric.** J. G. Ingram & Son, Ltd., assignee of G. D. Ingram, both of London, England.
432,563. **Dense Slabs of Ligno-Cellulose Fibrous Material Adapted for Die Stock and the Like.** Masonite Corp., assignee of C. F. Story, both of Laurel, Miss., U.S.A.
432,668. **Endless Belt.** B. F. Goodrich Co., Akron, assignee of B. A. Evans, Cuyahoga Falls, both in O., U.S.A.

CHEMICAL

United States

2,390,536. **Separating a Butane-Butene Mixture.** E. J. Houdry, Ardmore, and R. W. Blue, Swarthmore, both in Pa., assignors to Houdry Process Corp., Wilmington, Del.
2,390,567. **Method of Making Cold Shaped Articles of Polymeric Methyl Methacrylate Which Includes Treatment of the Polymeric Material with Hydrogen Peroxide.** W. E. Williams, Pasadena, Calif.
2,390,621. **Preparing an Unsaturated High Molecular Weight Hydrocarbon Polymer from a Substantially Saturated Linear Polymer.** B. H. Shoemaker, Hammond, Ind., and E. L. d'Ouville, assignors to Standard Oil Co., both of Chicago, Ill.
2,390,713. **An Alkylsulphenyl Dialkyldithiocarbamate.** M. Hunt, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.
2,390,734. **Disulphanilylguanidine.** A. E. Pierce, Bound Brook, N. J., assignor to American Cyanamid Co., New York, N. Y.
2,390,736. **Compound Including the Residue of a Rosin Substance and a Fatty Residue Containing from 8 to 22 Carbon Atoms.** D. Price, New York, N. Y., and E. L. May, Chevy Chase, Md., assignors to National Oil Products Co., Harrison, N. J.
2,390,764. **Separating Butadiene from a Hydrocarbon Mixture.** H. I. Wolff, Los Angeles, assignor to Shell Development Co., San Francisco, both in Calif.
2,390,779. **Production of 2,3-Butylene Glycol by Fermenting a Carbohydrate Solution.** R. T. K. Cornwell, assignor to Sylvania Products Corp., both of Fredericksburg, Va.
2,390,780. **Flexible, Waterproof Fabric Including a Coating of Coagulated Cellulose Ether, an Intermediate Coating Including a Hydrophobic Thermosetting Synthetic Resin Dissolved in an Organic Solvent and a Top Coating of a Cellulose Compound Dissolved in a Volatile Organic Solvent.** R. T. K. Cornwell, assignor to Sylvania Industrial Corp., both of Fredericksburg, Va.
2,390,829. **Rubber Substitute Consisting of a Mixture of Linseed Oil, Pine Tar, Carbon Black, Carbon Disulphide, Gum Rubber, and a Mixture of Hexamethylene Tetramine and Phenol.** J. H. Elder, Arlington, Tex.
2,390,853. **Preparing in Pulverulent Form Rubber-Like Condensation Products of Beta-Beta-Dichlorodiethyl Ether and Alkali Metal Polysulphides.** H. Taylor, Blackley, Manchester, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.
2,390,860. **Deresinification of Guayule Rubber by Treating Spongy Masses of Crude Guayule Rubber with a Mixture of Ethyl Alcohol and Benzene.** I. Williams, assignor to J. M. Huber Corp., both of Borger, Tex.
2,390,934. **Continuous Method of Separating Butadiene and Butylene from a Hydrocarbon Mixture.** C. L. Gregg, assignor to Dow Chemical Co., both of Midland, Mich.
2,390,951. **Producing a Gas Containing Isobutylene in High Concentration from Polymer Liquid Consisting Predominantly of Isobutylene-Butene Codimers.** L. N. Leum, Upper Darby, and F. G. Ciapetta, Yeadon, assignors to Atlantic Refining Co., Philadelphia, all in Pa.
2,390,961. **Polymerized Rubber-Like Product Obtained from a Mixture of Linseed and Cottonseed Oils Treated to Form a Jell to Which Are Added Consecutively Asphalt, a Small Percentage of a Cyclized Rubber, and a Control Component from the Group of Sulphur, Litharge, Zinc Oxide, and Carbon Black.** D. Sanderson, Bloomfield Hills, and H. E. Pfaff, Detroit, both in Mich., and M. E. Garrison, Compton, Calif.
2,390,996. **Coagulating Castilloa Rubber by Treating with Dilute NH_4OH and Then with Dilute HCl in the Presence of Heat.** T. F. Ford, Arlington, Va., assignor to the United States of America, as represented by the Secretary of Agriculture.
2,391,004. **Refining Butadiene in Admixture with Monovinylacetylene.** F. W. Breuer, Haverford, Pa., assignor to United Gas Improvement Co., a corporation of Pa.
2,391,055. **Forming in Successive Stages a Fluid Stop Intermediate the Ends of a Finished Sheathed Cable by Introducing a Readily Polymerizable Liquid into the Sheath.** L. I. Komives, J. W. Courtis, and D. E. F. Thomas, all of Detroit, Mich., assignors, by mesne assignments, to International Standard Electric Corp., New York, N. Y.
2,391,092. **Polystyrene Sheet Material.** W. Horback, Newark, N. J., assignor to Celanese Corp. of America, a corporation of Del.
2,391,095. **Producing Cured Interpolymers by Subjecting a Mixture of Ethylene and a Polyolefin to Interpolymerization Conditions at a Pressure of More Than 500 Atmospheres, and Then Heating the Interpolymer with a Sulphur.** H. B. Kellog, Union City, and P. K. Frolich, Westfield, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.
2,391,117. **Butadiene from Cyclohexane.** C. E. Ayres, Phillips, Tex., assignor to Phillips Petroleum Co., a corporation of Del.
2,391,158. **Production of Diolefins from a Mixture of Pentenes Including Pentene-2 and Trimethylethylene.** H. J. Hepp, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.
2,391,160. **Continuous Process for Manufacturing Butadiene from Normal Butane.** C. A. Hillman, Sea Girt, and D. L. Campbell, Short Hills, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.
2,391,162. **Interpolymer of Isobutylene and Vinyl Methacrylate.** D. W. Huebner and J. E. Feary, Norton-on-Tees, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.
2,391,188. **Making Butadiene by Catalytically Dehydrogenating an Aliphatic C_4 Hydrocarbon from the Group of Normal Butane and Normal Butenes.** R. J. Patterson, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.
2,391,218. **Polymeric Materials from Ethylene.** R. G. R. Bacon, Manchester, and R. B. Richards, Northwich, both in England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.
2,391,226. **Preparing a Cyclic Dicarboxylic Acid Anhydride by Reacting Equimolar Quantities of a Diolefin and a Chloro-Substituted Maleic Anhydride and Heating in the Presence of a Dehydrochlorination Catalyst.** A. M. Clifford, Stow, and C. E. Gleim, assignors to Wingfoot Corp., both of Akron, both in O.
2,391,227. **Extracting an Unreacted Acrylic Nitrile from an Emulsifier-Containing Synthetic Latex.** A. M. Clifford, Stow, O., and C. F. Winans, Edgewood, Pa., assignors to Wingfoot Corp., Akron, O.
2,391,233. **Polymerizing a Butadiene-1,3 Hydrocarbon in Aqueous Emulsion in the Presence of a Ketol in Which a Hydrogen Atom and the Hydroxyl Group Are Attached to a Carbon Atom Adjacent to the Ketol Group, and also in the Presence of an Organic Polysulphide.** E. E. Gruber, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,391,234. **Vulcanizing Rubber in the Presence of the Addition Product of Equimolecular Proportions of Carbon Bisulphide and 1-(alpha-Dimethylaminobenzyl)-Naphthol-2.** A. F. Hardman, assignor to Wingfoot Corp., both of Akron, O.
2,391,251. **Cyanhydrin Acetates of Pyruvic Acid Esters.** J. R. Long, assignor to Wingfoot Corp., both of Akron, O.
2,391,261. **Converting Maleic Anhydride to Monochloromaleic Anhydride by Chlorinating Molten Maleic Anhydride Which Contains a Chlorination Catalyst and a Halide of an Alkaline Earth Metal.** C. R. Milone, assignor to Wingfoot Corp., both of Akron, O.
2,391,281. **An Uncured Copolymer of Butadiene and Styrene Containing Methyl Alcohol as a Plasticizer.** H. H. Thompson, assignor to Wingfoot Corp., both of Akron, O.
2,391,293. **Solid Terpene Resins.** W. H. Carmody, Springfield, O., assignor to Pennsylvania Industrial Chemical Corp., Clairton, Pennsylvania.
2,391,330. **Composition Including a Copolymer of Butadiene-1,3 with Acrylonitrile, and as Softening Agent, Methallyl 3-Sulpholanyl Ether.** R. C. Morris, Berkeley, and E. C. Shokal, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.
2,391,359. **Solid, Substantially Colorless Terpene Polymer.** H. M. Spurlin, Marshallton, assignor to Hercules Powder Co., Wilmington, both in Del.
2,391,368. **Impregnating Composition Including a Water-Soluble Phenol-Aldehyde Resin and an Aqueous Emulsion of a Residue Low in Abietic Acid Remaining after Separation of Refined Rosin from Resinous Material Obtained by Solvent Extraction of Pine Wood.** G. J. Underwood, Chicago, Ill., assignor to Hercules Powder Co., Wilmington, Del.
2,391,465. **Vinyl Chloride.** W. A. Lazier, Wilmington, Del., and G. M. Whitman, Claymont, assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.
2,391,508. **Production of Butadiene by Subjecting 2,3-Butylene Glycol Diacetate at a Temperature of 200 to 550° C. to the Action of a Magnesium Silicate Catalyst.** H. Pines and V. N. Ipatieff, both of Riverside, assignors to Universal Oil Products Co., Chicago, both in Ill.
2,391,509. **Production of Butadiene by Subjecting 2,3-Butylene Glycol Diacetate at a Temperature from 200 to 550° C. to the Action of a Copper Phosphate Catalyst.** H. Pines and V. N. Ipatieff, both of Riverside, assignors to Universal Oil Products Co., Chicago, both in Ill.
2,391,555. **Production of Diolefins from a Straight Run Hydrocarbon Oil.** M. de Simo, Piedmont, and R. M. Roberts, Berkeley, assignors to Shell Development Co., San Francisco, all in Calif.
2,391,619. **Forming a Film of Vinyl Resin on Paper.** A. K. Doolittle, South Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.
2,391,620. **Moistureproofing Paper by Forming on the Surface a Non-Homogeneous Deposit of a Resinous Vinyl Polymer Formed Predominantly from Vinyl Chloride and a Wax Compatible therewith.** R. W. Quarles, Pittsburgh, Pa., and A. K. Doolittle, South Charlestown, W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.
2,391,621. **Coating Paper with a Dispersion of a Copolymer of Vinyl Chloride, Vinyl Acetate, Maleic Acid, a Copolymer of Vinyl Chloride and Vinyl Acetate, and a Paraffin Wax, in a Mixture of Methyl Ethyl Ketone, Methyl Isobutyl Ketone, and Hydrogenated Petroleum Naphtha.** G. M. Powell, III, South Charleston, and W. H. McKnight, Charleston, both of W. Va., assignors to Carbide and Carbon Chemicals Corp., a corporation of N. Y.
2,391,646. **Dehydrogenation of Normal Aliphatic Olefins to Produce Diolefins.** W. A. Schulze, J. C. Hillyer, and H. E. Drennan, all of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.
2,391,683. **Resinous Reaction Products of Aldehydes and Diazine Derivatives.** G. F. D'Alelio and J. W. Underwood, Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.
2,391,714. **Reclaiming Scrap Containing Elastic Polychloroprene by Mixing the Comminuated Scrap with Material Containing Cellulose Fibers, and Heating in the Presence of Water at a Temperature between 300 and 420° F.** W. G. Kirby and L. E. Steinle, both of Naugatuck, Conn., assignors to United States Rubber Co., New York, N. Y.
2,391,742. **Vulcanizable Composition Including an Elastic Linear Hydrocarbon Copolymer of a Branched-Chain Mono-Olefin and a Conjugated Diolefin, in Which Are Incorporated p-Quinone Dioxime, a Peroxide, Sulphur, and a Compound of the Class of Thiurams and Dithiocarbamates.** A. V. Roberts, West Haven, Conn., assignor to General Electric Co., a corporation of N. Y.
2,391,817. **Polymerizing a Mixture of a Methyl-Pentadiene from the Group of 2-Methyl-1,3-Pentadiene and 4-Methyl-1,3-Pentadiene, a Different Conjugated Double-Bond Diolefin, and a Compound of the Group of Styrene, Alpha Methyl Styrene, Acrylonitrile, and Methacrylonitrile.** B. O. Blackburn, Kensington Park District, assignor to Shell Development Co., San Francisco, both in Calif.
2,391,821. **Converting 4-Methyl, Alpha-Methyl**



Styrene to p-Methyl Styrene, in the Vapor Phase. J. K. Dixon, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.
2,391,827. **Production of Chloroprene by Subjecting Vapors of a Substance from the Group of 2,3-Dichlorbutene-1, 1,2-Dichlorbutene-2, 1,3-Dichlorbutene-2, and 3,3-Dichlorbutene-1 to Thermal Dehydrochlorination in the Absence of a Basic Agent and of a Catalyst at a Temperature between 450 and 650° C.** G. W. Hearne, Berkeley, and M. L. Adams, Lafayette, assignors to Shell Development Co., San Francisco, all in Calif.

Dominion of Canada

432,100. **Increasing the Plasticity of Rubber by Mixing with Unvulcanized Rubber a Small Amount of a Condensation Product of Formaldehyde with a Cyclic Secondary Amine and Hydrogen Sulphide.** American Cyanamid Co., New York, N. Y., assignee of R. T. Dean, Stamford, Conn., U.S.A.
432,101. **Plasticizing and Softening Rubber and Synthetic Rubber-Like Materials by Mixing Such Materials as beta-Substituted Oxypropionic Acid Ester of the Formula:**
$R—OCH_2CH_2COOR'$
in Which R and R' Are from the Group of Alkyl, Aralkyl and Aryl Groups. American Cyanamid Co., New York, N. Y., assignee of R. T. Dean, Stamford, Conn., U.S.A.
432,160. **Thermoplastic Vulcanizate Including the Reaction Product of Sulphur and a Copolymer of a Conjugated Diene and a Nuclear Chlorinated Styrene.** Mathieson Alkali Works, New York, assignee of C. C. Clark, Kenmore, both in N. Y., U.S.A.
432,263. **Granular or Globular Polymerization Products of Methyl Methacrylate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. Renfrew, J. M. Walter, and W. E. F. Gates, all of Norton-on-Tees, Durham, England.
432,264. **Rubber Article Reenforced with a Fibrous Material of Regenerated Cellulose Bonded to the Rubber by Means of a Cyanate from the Group of Polyisocyanates, Polyisothiocyanates, and Mixed Isocyanate-Isothiocyanate Compounds, and a Rubber.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. M. Neal and J. J. Verbanc, both of Wilmington, Del., U.S.A.
432,399. **Organic Plastic Material Obtained by Reacting a =C=O Containing Organic Compound from the Class of Aldehydes and Ketones and a Hydrolyzed Copolymer of Substances Including a Vinyl Ester of an Organic Carboxylic Acid and a Divinyl Aryl Compound.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio, Pittsfield, Mass., U.S.A.
432,400. **Plastic Composition Obtained by Hydrolyzing a Copolymer of a Vinyl Ester and an Organic Nitrile Containing a $CH_2=C=$ Grouping and Reacting Simultaneously with a =C=O-Containing Compound from the Class of Aldehydes, Ketones, and Mixtures of Aldehydes and Ketones.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio, Pittsfield, Mass., U.S.A.
432,401. **Synthetic Composition Including the Reaction Product of a =C=O-Containing Organic Compound from the Class of Aldehydes, Ketones, and Mixtures of Aldehydes and Ketones, and a Partially Hydrolyzed Polymerized Diallyl Ester of a Saturated Aliphatic Dicarboxylic Acid.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio, Pittsfield, Mass., U.S.A.
432,514. **Crystalline Guanidine Hydrochloride.** American Cyanamid Co., New York, N. Y., assignee of D. W. Jayne, Jr., Old Greenwich, and H. M. Day, Cos Cob, both in Conn., both in the U.S.A.
432,533. **In Electrical Apparatus Including Conducting Elements Disposed in Spaced Relation to Each Other, an Insulating Medium between the Elements Consisting of a Liquid Organic-Siloxane.** Corning Glass Works, assignee of J. F. Hyde, both of Corning, N. Y., U.S.A.
432,544. **Chlorinated Rubber with a Viscosity Characteristic above 7,000 Centipoises.** Hercules Powder Co., Wilmington, Del., assignee of W. H. Stevenson, Parlin, N. J., both in the U.S.A.
432,660. **As Water-Repellent Coating, a Composition Including a Resin Adapted to Be polymerized after Application of the Coating, and a Wax of High Melting Point.** General Motors Corp., Detroit, Mich., assignee of R. Canter and H. D. Geyer, both of Dayton, O., both in the U.S.A.
432,686. **Purifying Monomeric Styrene Containing Small Amounts of Oxidized Compounds by Adding an Amine and Then Distilling the Styrene.** Monsanto Chemical Co., St. Louis, Mo., assignee of E. W. Gluesenkamp, Dayton, O., both in the U.S.A.
432,687. **An Emulsion of a Hydrogenated Ester Gum in an Aqueous Medium Containing Casein as an Emulsifier.** National Oil Products Co., Harrison, assignee of A. N. Stull, Newark, and W. L. Abramowitz, Lakewood, all in N. J., U.S.A.

United Kingdom

573,482. **Derivatives of Linear Polyamides.** E. I. du Pont de Nemours & Co., Inc.
573,507. **Acrolein and Ethylene.** J. G. M. Bremmer, D. G. Jones, and Imperial Chemical Industries, Ltd.
573,525. **Gas-Expanded Rubber Materials.** Expanded Rubber Co., Ltd., and A. Cooper.
573,529. **Synthetic Rubber-Like Materials.** B. J. Habgood, R. Hill, L. B. Morgan, and Imperial Chemical Industries, Ltd.
573,530. **Manufacture and Application of Synthetic Rubber-Like Materials.** H. Gudgeon, E. Isaacs, W. M. Morgan, and Imperial Chemical Industries, Ltd.
573,533. **Diolefin Polymerization Products.** Wingfoot Corp.
573,536. **Chlorinated Rubber.** Hercules Powder Co.
573,561. **Vinyl Chloride.** Distillers Co., Ltd., H. M. Stanley, and G. Minkoff.
573,563. **Nitriles and Products thereof.** Wingfoot Corp.
573,567. **Method of Polymerization.** A. M. Borders, W. D. Wolfe, H. J. Osterhof, and C. W. Walton.
573,573. **Unsaturated Aldehydes and Ketones.** Distillers Co., Ltd., T. B. Philip, H. M. Stanley, and W. A. Smart.
573,589. **Alginic Materials.** Cefoil, Ltd., and R. C. Rose.
573,591. **Alginic Acid Compounds.** G. E. Cunningham, N. H. Chamberlain, J. B. Speakman, and Cefoil, Ltd.
573,592. **Cyclopentadiene.** Trinidad Leaseholds, Ltd., and T. K. Hanson.
573,594. **Vinyl Chloride.** Distillers Co., Ltd., H. M. Stanley, G. Minkoff, and J. Youell.
573,596. **Alpha Halo Acrylates.** Wingfoot Corp.
573,597. **Tetrahydrofurfuryl Alpha Chloroacrylate.** W. W. Triggs (Wingfoot Corp.).
573,622. **Synthetic Resins.** Distillers Co., Ltd., J. D. Morgan, and B. Frenkel.
573,624. **Dichloropropyl-Alpha-Chloroacrylate.** Wingfoot Corp.
573,625. **Cyanoethyl-Alpha-Chloroacrylate.** W. W. Triggs (Wingfoot Corp.).
573,626. **Synthetic Resins.** British Resin Products, Ltd., J. D. Morgan, and B. Frenkel.
573,631. **Butadiene.** W. Szukiewicz.
573,670. **Vinyl Chloride.** E. I. du Pont de Nemours & Co., Inc., W. A. Lazier, and G. M. Whitman.
573,723. **Polymerizable Unsaturated Acids.** Distillers Co., Ltd., J. J. P. Staudinger, K. H. W. Tuerck, and E. H. Brittain.
573,727 and 573,752. **Condensation Products of Acetylene.** Distillers Co., Ltd., J. J. P. Staudinger, K. H. W. Tuerck.
573,759. **Flexible Films, Filaments, Etc.** Associated Insulation Products, Ltd., (Research Corp).
573,778. **Aliphatic Dienes.** H. Dreyfus, F. Bryans, and J. G. N. Drewitt.
573,785. **Polymerized Nitroethylene.** A. E. W. Smith, R. H. Stanley, C. W. Scaife, and Imperial Chemical Industries, Ltd.
573,805. **Resins.** Refiners, Ltd., T. Scott, and G. Baddeley.
573,809. **Manufacture of Interpolymers of Aromatic Vinyl Hydrocarbons with Other Polymerizable Organic Compounds and Coating Compositions Obtained therefrom.** L. Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage.
573,811. **Vulcanized Materials.** J. G. Cook, D. A. Harper, R. J. W. Reynold, W. F. Smith, and Imperial Chemical Industries, Ltd.
573,826. **Condensation Products of Lac.** B. S. Gidvani and Indian Lac Cess Committee.
573,835. **Coating Compositions of Interpolymers of Styrene with Polyhydric Alcohol Mixed Esters.** L. Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage.
573,839. **Thermoplastic Compositions.** E. F. Brookman, L. M. Smith, and Imperial Chemical Industries, Ltd.
573,840-41. **Thermoplastic Compositions.** E. F. Brookman, S. F. Pearce, and Imperial Chemical Industries, Ltd.
573,842. **Sheet Materials Including Polyvinyl Chloride.** J. H. McGill and Imperial Chemical Industries, Ltd.
573,844-45. **Interpolymers of Iso-Olefins.** D. W. Huebner, J. E. Feary, and Imperial Chemical Industries, Ltd.
573,866. **Amino-Formaldehyde Resins.** W. Walker & Sons, Ltd., J. R. Alexander, D. Burton, and F. Hausmann.
573,887. **Adhesive Compositions.** B. J. Balfe and Imperial Chemical Industries, Ltd.
573,906. **Organo Substituted Silicon Compounds.** Revertex, Ltd., C. Bondy, and K. Reiser.
573,932. **Bonding of Polymeric Materials to the Surface of Articles.** Imperial Chemical Industries, Ltd.
573,935. **Pulverulent Plastic Compositions Including Bituminous or Resinous Binding Agents.** A. Sommer.
573,960. **Organo-Silicon Polymers.** Revertex, Ltd., C. Bondy, and K. Reiser.
573,965. **New, Rubber-Like Polymeric Materials.** E. I. du Pont de Nemours & Co., Inc., and C. J. Mighton.
573,966. **Cellular Structures.** Revertex, Ltd., and D. Parsons.
573,988. **Halogen Derivatives of Rubber and Rubber-Like Materials.** Hercules Powder Co.

MACHINERY

United States

2,390,803. **Apparatus for Manufacturing Plastic Materials.** C. F. Marschner, Normandy, assignor to McDonnel Aircraft Corp., St. Louis, both in Mo.
2,391,300. **Apparatus for Repairing Pneumatic Tire Casings.** J. J. Detting, assignor to General Tire & Rubber Co., both of Akron, O.

Dominion of Canada

432,078. **Rubber Boot Resoling Device.** J. W. LaFollette, Denver, Colo., U.S.A.
432,198. **Apparatus for the Continuous Lateral Stretching of Thermostretchable, Elastoplastic Film Material.** Wingfoot Corp., Akron, assignee of R. C. Martin, Cuyahoga Falls, O., both in U.S.A.
432,398. **Apparatus for Applying Plastic Material to Wires.** Callender's Cable & Construction Co., Ltd., London, assignee of J. Taylor and T. L. Osborne, both of Leigh, Lancashire, both in England.
432,498. **Apparatus for Producing Sponge Rubber.** T. A. TeGrotenhuis, Olmsted Falls, O., U.S.A.
432,506. **Dipping Form for Hollow, Non-Inflatable, Self-Supporting, Rubber Articles of Complex Shape.** N. E. Tillotson, Watertown, Mass., U.S.A.
432,542. **Tire Building Apparatus.** General Tire & Rubber Co., assignee of W. J. Breth and R. M. Wormald, all of Akron, O., U.S.A.

United Kingdom

573,411. **Machines for Use in the Manufacture of Molded Articles.** B. B. Chemical Co., Ltd., (B. B. Chemical Co).
573,644. **Devices for Stretching Rubber Tubing for Sleeving Cable Ends.** R. T. Wells.

UNCLASSIFIED

United States

2,390,510. **Device for Testing the Strength of Adhesion between Bonded Layers of a Test Specimen.** C. K. Chatten, Jackson Heights, N. Y.
2,390,900. **Pacing a Tenacious Thin Film Article of Cup-Shape.** C. J. Schmid, assignor to Julius Schmid, Inc., both of New York, N. Y.
2,390,956. **Anti-Skid Device.** R. C. McNeer, Richmond, Va.
2,391,235. **Hose Clamp.** C. E. Hathorn, Kenmore, N. Y., assignor to Curtiss-Wright Corp., a corporation of Del.
2,391,435. **Grip Mechanism for the Test Piece in a Tensile Tester.** F. A. Melzer, Gary, Ind.
2,391,626. **Tire Tool.** B. W. Howard, deceased, by R. L. Howard, administratrix, Aguanga, Calif.
2,391,652. **Tire Inflating Device.** G. E. Stevenson, Coquille, Oreg.
2,391,721. **Fixture for Slitting Jackets of Rubber Covered Cables.** C. V. Lundeen, Towson, Md., assignor to Western Electric Co., Inc., New York, N. Y.
2,391,722. **Hand Tool for Slitting the Insulation of Rubber-jacketed Cables, Etc.** C. V. Lundeen, Towson, Md., assignor to Western Electric Co., Inc., New York, N. Y.
2,391,804. **Hose Clamp.** N. D. Smith, Aberdeen, Md.

Dominion of Canada

432,207. **Processing Yarns from Cellulosic Filaments for the Production of Tire Cord.** C. Dryfus, assignee of W. Whitehead, both of New York, N. Y., U.S.A.
432,385. **Treating Ferrous Metal Wire to Increase its Rubber-Adherent Properties.** American Steel and Wire Co. of New Jersey, Cleveland, O., assignee of W. E. Leonard, Worcester, Mass., U.S.A.
432,472. **Electric Cable Reels.** Western Electric Co., Inc., New York, N. Y., assignee of J. B. Barrett, Baltimore, Md., U.S.A.

432,558. **Non-Skid Device.** Kennedy & Kemp, Ltd., Longparish, assignee of E. A. Dennison, Goodworth Clatford, both in Hampshire, England.

United Kingdom

573,417. **Fluid Pressure Indicators for Pneumatic Tires and Other Inflated Bodies.** W. Turner.

573,424. **Apparatus for Filling Tires with Fluid.** Wingfoot Corp.

573,646. **Hose Couplings.** Merryweather & Sons, Ltd., R. E. Stubbington, A. W. Burford, and F. W. Bates.

573,695-97. **Metal Hose Clips.** R. C. S. Jamie and Hunt & Turner, Ltd.

573,920. **Connectors for Electric Cables.** J. A. Crabtree & Co., Ltd., W. E. Hill, and T. D. G. Wintle.

574,030. **Non-Skid Chains for Road Vehicle Wheels.** D. S. Kennedy.

574,080. **Jointing of Flexible Pipes.** J. L. Sayers.

574,083. **Anti-Skid and Tire Supporting Bands for Double Tire Wheels.** I. T. Sandberg.

574,093. **Securing Pneumatic Tires to Vehicle Wheels.** Dunlop Rubber Co., Ltd., W. E. Hardman, and R. F. Daw.

TRADE MARKS

United States

417,823. Representation of a feather with the words: **"Glamour Debs,"** written on it. Footwear. Bourbeuse Shoe Co., Union, Mo.

417,825. **California Cajolers.** Footwear. Allied Stores Corp., Wilmington, Del., doing business as "The Bon Marche," Seattle, Wash., Dey Brothers & Co., Syracuse, N. Y., and Quackenbush Co., Paterson, N. J.

417,830. **Sil-O-Sil.** Organo-silicon compounds. F. J. Sowa, doing business as Sowa Chemical Co., New York, N. Y.

417,869. **Goodyear-Guardian.** Baby pants. Goodyear Rubber Sundries, Inc., New York, N. Y.

417,881. **Methide.** Chemicals used in combination with resins and resin dispersions for waterproofing textiles and paper. Monsanto Chemical Co., St. Louis, Mo.

417,890. **Jogs.** Footwear. Commonwealth Shoe & Leather Co., Whitman, Mass.

417,891. **Licito.** Footwear. Andrew Geller Shoe Mfg. Co., Inc., Brooklyn, N. Y.

417,957. **Kyso.** Hose. Standard Oil Co., Louisville, Ky.

418,016. **Val-Keen.** Tires and inner tubes. Oakes & Co., also doing business as Tru-Test, Chicago, Ill.

418,068. **Multi-Pak.** Merchandise envelopes of cellophane and Plioflim. Ivers-Lee Co., Newark, N. J.

418,114. **Cementspar.** Adhesive cement. Phelan-Faust Paint Mfg. Co., St. Louis, Mo.

418,121. **Therm-O-Welt.** Adhesive material in liquid form. Packaging Industries, Ltd., Montclair, N. J.

418,226. **Witcolac.** Carbon black. Witco Chemical Co., Chicago, Ill.

418,227. **Witcolith.** Carbon black. Witco Chemical Co., Chicago, Ill.

418,277. **Piccolastic.** Hydrocarbon resins. Pennsylvania Industrial Chemical Corp., Clairton, Pa.

418,283. **Gesafloc.** Dispersing and flocculating chemical for solids in an aqueous medium. Geigy Co., Inc., New York, N. Y.

418,294. **Plasjoin.** Cement. Merritt Products Co., Cleveland, O.

418,298. **Sea-bee.** Outboard motors. Goodyear Tire & Rubber Co., Inc., Akron, O.

418,324. **Velocote.** Fabrics of natural or synthetic fibers treated with plastics and/or synthetic resins. Firestone Tire & Rubber Co., doing business as Firestone Industrial Products Co., Akron, O.

418,362. Representation of a triangle with the word **"Surco"** written thereon. Insulated wire, cords, tubing, and tape. A. H. Surprenant, Boston, Mass.

418,416. **Masticglaze.** Permanently elastic compound used as putty substitute. Tremco Mfg. Co., Cleveland, O.

418,419. **Patent-Glo.** Treated textile fabrics used as a leather substitute. Patent Fabric Co., Boston, Mass.

418,421. **Montrose.** Insulated electric wire and flexible tubing for electrical wires. J. F. Mattimore, doing business as Montrose Products and Montrose Products Co., Worcester, Mass.

418,461. **Heribex.** Cement. H. J. Heribert, New York, N. Y.

418,477. **Flex-I-Tape.** Finger tape. J. W. Stevens, Sparkhill, N. Y.

418,490. **Mecalite.** Arch supports. Scholl Mfg. Co., Inc., Chicago, Ill.

FINANCIAL

Brown Rubber Co., Lafayette, Ind. Thirty-nine weeks to September 29, 1945: net profit, $124,452, equal to 59¢ each on 211,100 shares.

Dayton Rubber Mfg. Co., Dayton, O., and subsidiaries. Nine months ended July 31, 1945: net profit, $646,676, or $2.55 each on 226,671 common shares; net sales, $19,304,156.

The Firestone Tire & Rubber Co., Akron, O., including all subsidiaries. Year ended October 31, 1945: net profit, $16,446,735, equal to $7.42 a common share, contrasted with $16,310,845, or $7.34 a share, in the preceding fiscal year; net sales, $681,744,072, a record, against $651,410,411; provision for depreciation and amortization, $30,242,337; reserve for contingencies, $2,500,000; taxes, $65,789,178; current assets, $181,600,349; current liabilities, $42,593,709.

Lee Rubber & Tire Corp., Conshohocken, Pa., and subsidiary. Year ended October 31, 1945: net income, $1,206,594, equal to $5 a share, against $1,299,849, or $5.38 a share, in the preceding fiscal year.

Norwalk Tire & Rubber Co., Norwalk, Conn. Year ended September 30, 1945: net sales, $8,827,507, compared with $6,359,590 in the previous fiscal year; net profit, $223,052, equal to 95¢ a common share, compared with $156,142, or 62¢ a share; taxes, $574,300, against $368,000.

Midwest Rubber Reclaiming Co., East St. Louis, Ill. Year to October 31, 1945: net income, $356,197 equal to $2.67 each on 124,440 common shares, compared with $352,688, or $2.63 each on 125,000 shares, for the preceding 12 months.

Pharis Tire & Rubber Co., Newark, O., and subsidiaries. Year to October 31, 1945: net profit, $145,193, against $112,660 in the year ended October 31, 1944; net sales, $13,215,908, compared with $11,830,519.

Shellmar Products Corp., Mt. Vernon, O. Nine months to September 30, 1945: net profit, $731,668, compared with $894,781 for the year 1944; net sales, $24,697,695, against $30,666,737 for 1944.

Taylor Instrument Cos., Rochester, N. Y. Quarter ended October 31, 1945: net income, $107,616, or 68¢ each on 159,270 common shares; net sales, $2,409,391. Year ended July 31, 1945; net income, $584,666, or $3.67 a share; sales, $12,765,000.

Union Asbestos & Rubber Co., Chicago, Ill. Nine months to September 30, 1945: net income, $405,281, or 85¢ each on 475,376 shares, compared with $585,662, or $1.23 a share, for the whole year 1944; net sales $6,829,021, against $10,615,342 in 1944.

United Carbon Co., Charleston 27, W. Va., and subsidiaries, for 1945: net income, $2,263,867, equal to $5.69 a share, against $2,232,286 or $5.16 a share for 1944; net sales, $14,458,738, against $13,456,724.

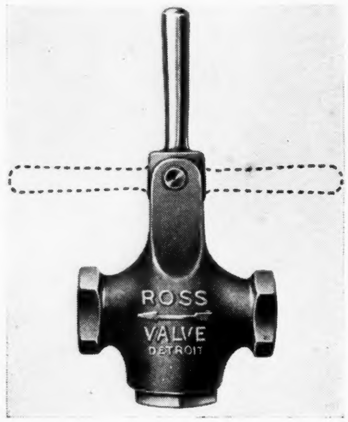
Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Wringer Co.	Com.	$0.75 extra	Apr. 1	Mar. 15
Belden Mfg. Co.	Com.	0.30 q.	Mar. 1	Feb. 18
Boston Woven Hose & Rubber Co.	Com.	0.50 q.	Feb. 25	Feb. 15
Brunswick-Balke-Collender Co.	Com.	0.25 q.	Mar. 15	Mar. 1
Brunswick-Balke-Collender Co.	Pfd.	1.25 q.	Apr. 1	Mar. 20
Canadian Tire, Ltd.	Com.	0.20 q.	Mar. 1	Feb. 21
Crown Cork & Seal, Ltd.	Com.	0.25 q.	Feb. 9	Feb. 5
Crown Cork & Seal, Ltd.	Pfd.	0.50 q.	Mar. 15	Feb. 21
Detroit Gasket & Mfg. Co.	Com.	0.30 q.	Mar. 1	Feb. 15
E. I. du Pont de Nemours & Co., Inc.	Com.	1.25	Mar. 14	Feb. 25
E. I. du Pont de Nemours & Co., Inc.	Pfd.	1.12½ q.	Apr. 25	Apr. 10
Electric Hose & Rubber Co.	Com.	3.00	Feb. 21	Feb. 14
Faultless Rubber Co.	Com.	0.50	Apr. 1	Mar. 15
Firestone Tire & Rubber Co.	Pfd.	1.12½ q.	Mar. 1	Feb. 15
Flintkote Co.	Com.	0.15	Mar. 11	Feb. 25
Flintkote Co.	Pfd.	1.00	Mar. 15	Mar. 1
General Cable Corp.	Pfd.	1.75 accum.	Feb. 1	Jan. 21
General Motors Corp.	Com.	0.75	Mar. 9	Feb. 14
General Motors Corp.	Pfd.	1.25 q.	May 1	Apr. 8
General Tire & Rubber Co.	Com.	0.25 q.	Feb. 28	Feb. 18
General Tire & Rubber Co.	Com.	1.00 q.	Apr. 1	Mar. 1
Hewitt Rubber Corp.	Com.	0.25 q.	Mar. 15	Feb. 28
I. B. Kleinert Rubber Co.	Com.	0.25	Mar. 12	Mar. 1
Lee Rubber & Tire Corp.	Com.	0.75 extra	Feb. 1	Jan. 15
Lee Rubber & Tire Corp.	Com.	0.50 q.	Feb. 1	Jan. 15
Master Tire & Rubber Corp.	Com.	0.25	Dec. 31	Dec. 20
Midwest Rubber Reclaiming Co.	Com.	0.50 q.	Feb. 1	Jan. 18
Norwalk Tire & Rubber Co.	Com.	0.25	Mar. 1	Feb. 15
Norwalk Tire & Rubber Co.	Pfd.	0.87½ q.	Apr. 1	Mar. 15
Okonite Co.	Com.	1.50 q.	Feb. 1	Jan. 15
Phelps-Dodge Copper Corp.	Com.	0.40 q.	Mar. 8	Feb. 21
Philadelphia Insulated Wire Co.	Com.	0.25 s.	Feb. 15	Feb. 1
Seiberling Rubber Co.	$2.50 1st Pfd.	0.63 q.	Apr. 1	Mar. 15
Seiberling Rubber Co.	5% "A" Pfd.	1.25 q.	Apr. 1	Mar. 15
Thermoid Co.	Com.	0.15 q.	Mar. 15	Mar. 5
Thermoid Co.	Pfd.	0.62½	Feb. 1	Jan. 25
Tyer Rubber Co.	Pfd.	1.50 q.	Feb. 15	Feb. 8
Union Asbestos & Rubber Co.	Com.	0.17½ q.	Apr. 2	Mar. 20
United Elastic Co.	Com.	0.50 q.	Mar. 11	Feb. 19
U. S. Rubber Reclaiming Co., Inc.	Pfd.	0.75 accum.	Jan. 12	Jan. 5
United States Rubber Co.	Com.	0.50	Mar. 11	Feb. 18
United States Rubber Co.	1st Pfd.	2.00	Mar. 11	Feb. 18
United States Rubber Co.	1st Pfd.	2.00	June 10	May 20
Westinghouse Airbrake Co.	Com.	0.25	Mar. 15	Feb. 15
Westinghouse Electric Co.	Pfd.	0.25 q.	Feb. 28	Feb. 11
Westinghouse Electric Co.	Com.	0.25 q.	Feb. 28	Feb. 11
S. S. White Dental Mfg. Co.	Com.	0.30 q.	Feb. 13	Jan. 28

New Machines and Appliances

New Shut-Off Valve

A NEW shut-off valve is being marketed by the Ross Operating Valve Co. as an addition to its line of poppet type, air operated valves. This new valve was designed primarily for use in air lines, but is recommended for use in gas and low-pressure liquid lines. It is made of non-corrosive metals and is of simple design with few parts.

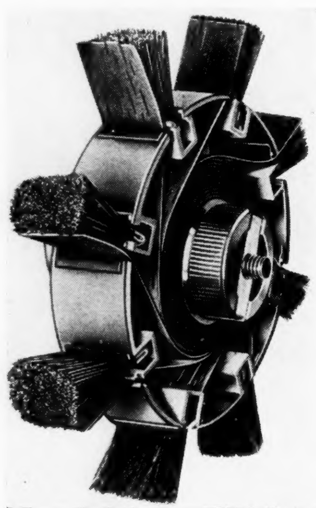


Improved Ross Valve

According to John Sainsbury, general manager of the company, outstanding features of this new valve are full flow or full pipe area, quick action by flipping the controlling lever, self-locking in both closed or open positions, positive shut-off with leakproof sealing by means of line pressure, and visual indication by position of the shut-off lever. Four standard sizes are now in production: ¼-inch, ⅜-inch, ½-inch, and ¾-inch.

All-Purpose Sanding Wheel

A NEW, brush-backed sanding wheel, known as the Sand-O-Flex, sands, deburrs, and finishes rubber products, plastics, woods, metals, and many types of special materials. The outstanding feature of this sanding device is its adaptability to jobs formerly done only by hand. It consists of a central magazine which houses the strip abrasive. Eight of these strips extend through the housing and are held against the work by tough bristles. The bristles cushion the abrasive, making it possible to get in and around corners, hollow and fluted surfaces, and small openings.

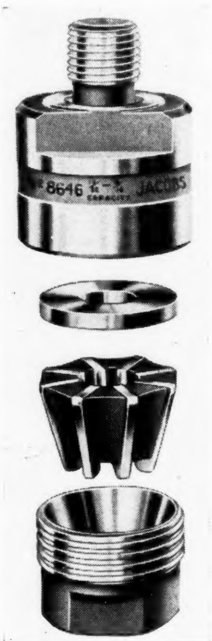

Rear View of Sand-O-Flex Wheel Showing Construction

The body and cover of the Sand-O-Flex are cast from Zamak. Overall diameter, including brushes, is approximately eight inches. Weight fully loaded is about 2¾ pounds. Normal loading contains 20 feet of abrasive, and reloading is done by unscrewing the serrated nut and removing the cover. A wide range of abrasives of various grits and grades are supplied for use with the sander. These cartridges, plus the quick-charging feature, permit the same tool to be used in all operations from rough stage to polished surfaces.

The Sand-O-Flex fits all standard ½- and ⅝-inch motor shafts, stationary or flexible, and can be supplied to fit almost any shaft size upon request. A ¼ h.p. electric motor will handle all normal operations. Sand-O-Flex Corp.

Improved Drill Chuck

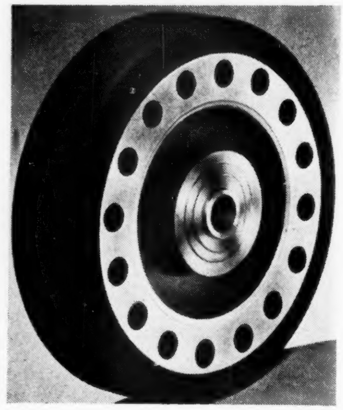
A RADICALLY new type of heavy-duty drill chuck, in which a tough web of neoprene synthetic rubber keeps the jaws in better alinement and permits one chuck to take a wider range of drill sizes, has been developed by The Jacobs Mfg. Co. The rubber replaces the flexible spring steel collet of the traditional single-purpose type of drill chuck. The rubber is bonded to the steel jaws and passes through anchoring holes in them, forming a compact, conical unit. The "Rubber-Flex Collet," as it has been named, is tightened by a screw mechanism which forces it forward into the smooth funnel-shaped nose of the chuck. As soon as the chuck is loosened, for changing drills, the neoprene web pushes the jaws apart and releases the drill shank. Arthur M. Stoner, inventor of the new chuck and vice president of the company, explained that neoprene was finally selected because of its oil resistance, its low set properties, and its all-around toughness.


Component Parts of Jacobs Drill Chuck

All working faces of the hardened alloy steel jaws are precision ground after assembly in the neoprene matrix. Because the jaws are always parallel, they maintain full-length contact with the drill shank, thus providing much more gripping area than in conventional collets, making for unusual accuracy. The design is such that, in use, the collet is self-tightening, with a toggle-like action. Versatility and ruggedness of the new-type chuck are expected to bring greater economy and efficiency in large-scale machine shop work. It is stated that 12 of the "Rubber-Flex" collets and three detachable arbors will handle the range of operations requiring 300 of the ordinary single-purpose collets. Models now being produced are for multiple spindle drilling machines. Plans are under way to introduce the new collets in portable electric drills and hand drills.

New Goods and Specialties

Trucker Wheel New Industrial



Grizzly Tread-Lock Wheel

THE Grizzly tread-lock wheel, made by the Thermoid-Grizzly Wheel sales division of Thermoid Co., is now available for new equipment and replacements. The wheel is an adaptation for industrial use of the Grizzly tail-wheel used successfully by Navy aircraft during the war. The patented feature of "sealed in lubrication" insures proper and automatic lubrication of the sealed precision-built bearings, putting the load on the wheels. Another exclusive feature is the patented "breather" holes in the casting which allow for expansion and contraction of the rubber tire with pressure, making for a no-bulge tire.

The "cut resistant tread" is tough and will not pull apart or chunk-off under any condition, according to the manufacturer. At the same time this tread is gentle to floors and will not cut or mar surfaces, as will the old-type cast-iron or forged steel tread. In addition tests have shown these wheels with rubber treads to be easier to start and keep rolling than metal rim wheels. The Grizzly tread-lock wheel is available in standard sizes of six, eight, 10, and 12 inches, and special sizes can be made to order to fit all standard axles.

Combination Gas Mask and Splash Hood

Neoprene Hood on Full-Vision Gas Mask

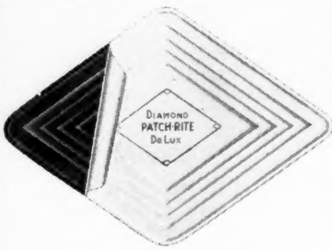
NOW on the market is a new combination gas mask and splash hood designed to give full head and respiratory protection on operations involving toxic gases and fumes, when accompanied by the hazard of splashes of acids, caustics, and other harmful substances. It is made of a Full-Vision gas mask to which has been adapted a completed head covering of neoprene, with all seams fully vulcanized. The hood extends well down over the shoulders, chest, and back of the wearer. It is demountable and may easily and quickly be removed from the mask for cleaning and replacing when necessary. For emergency or short period use, the product is made in the straight canister type. For longer periods or daily use, a hose attachment to a compressed air line may be employed. Industrial Products Co.

Neoprene Work Glove

Stanzoil Safety Glove

A NEW Stanzoil neoprene-coated canvas glove designed for industrial use is being manufactured by the Pioneer Rubber Co. One of its features is its color, safety red, to warn a worker when his hands are dangerously near moving machinery. Oil and acid resistant, the gloves are made of milled neoprene to provide a tough coating for greater resistance to abrasion and other wear hazards. Curved fingers give greater comfort and make gripping tools and other objects easier. Made in both knit (No. R-26) and gauntlet (No. R-27) wrist styles, the gloves are manufactured in one standard size.

Diamond Patch-Rite DeLux Patch



New Tire Casing Patch

BUMPING caused by tire casing patches is reduced considerably by the shape of the new Diamond Patch-Rite DeLux patch manufactured by the Buxbaum Co. The patch is designed in a modified cone shape, increasing in thickness from the edges toward the center. A new overlapping cord principle and greater cordply area give maximum protection to the casing break. Made to fit all injuries, the patch can be vulcanized for a permanent repair or be used as a highly successful cold patch. Both regular and sidewall sizes are available.

Flexigrip Tube Fitting

FLEXIGRIP time-saving tube fittings which eliminate end preparation or soldering of the tubing and yet produce a stronger, leakproof, and flexible joint have been announced by Gustin-Bacon Mfg. Co. The fittings, available in brass, aluminum, or steel, come in standard sizes from ⅛-inch to 1½-inch O.D. They consist of four parts: the body, a gripping ring, a synthetic rubber gasket, and a nut. To attach the fitting, the nut (with gasket and ring inside) is slipped over any plain-end tube cut to desired length.

(Continued on page 877)

FAR EAST

CEYLON

Tapping Experiments

The Combined First and Second Quarterly Circulars of the Rubber Research Scheme (Ceylon), just to hand, are devoted chiefly to tapping experiments.

In the Field Experiments on Dartonfield Estate, C. A. de Silva reports on the performance of various tapping systems in the eighth year of experimental tapping. The chief systems tested were: the half spiral, alternate daily of 100% intensity (control); the half-spiral, alternate daily, with rest periods, giving a system of 67% intensity; half-spiral, alternate daily on alternate sides; two quarter cuts, alternate daily; and two half-spiral cuts every fourth day (the double-four system), all of 100% intensity; and two half cuts every third day (the double-three system), of 133% intensity.

The double-three system has consistently given the highest yields; the peak was reached in 1941-42 with an increase of 28.5 over the control. However, since then there has been a sharp drop and in 1944-45 the increase as compared with the control was only 11.4%, the average increase over the eight years of the experiment was 19.3%. On the basis of results reported at the Rubber Research Institute, Malaya, for 1939, it is thought that the decline in crop may be related to a change in the height of the tapping cut, and in that case there should eventually be a recovery.

The yields of the milder tapping systems of 67% intensity have been substantially higher than might have been expected from the intensity of the system. The half-spiral alternate daily cut on alternate sides also showed increases through the eight-year period, and the yields were comparable with those of the double-four, but tapping costs were higher. Dry rubber content and bark renewal proved generally satisfactory. On the other hand a considerable increase in the number of cases of Brown Bast was reported for all tapping systems in 1944-45, especially in the second half of the tapping year when weather conditions were exceptionally unfavorable.

An intensive tapping experiment, reported by C. C. T. Sharp, was also carried out to provide information for those rubber growers who on government urging were preparing in mid-1943 to tap certain areas, destined subsequently to be replanted, to exhaustion within two years.

In all, four tapping systems were tested: the double-one (two half spiral cuts daily), of 400% intensity; the double-two (two half-spiral cuts every second day) of 200% intensity; the double-three, 133%, and the double-four, 100%; the double-three served as control.

At first very high yields were obtained with the double-one, but soon outputs fell rapidly until they were but little better than those from the double-two. When upward tapping was adopted, there was a marked increase in crop again, but even so it was evident that the system is too heavy to be profitable for two years, at least under Ceylon conditions. In Java, better results were reported in tests made before the Japanese invasion.

The double-two yielded 136% of the control in the first six months of the test, but thereafter only 120%, until upward tapping was introduced when output increased again to 132%.

In general it was concluded that if upward tapping had been adopted earlier in the experiment, much better results could have been obtained.

Mr. Sharp adds a note on upward tapping in which he points out that the system is not new. It was first referred to by Wright in 1912, who mentioned a small experiment made in Java by Tromp de Haas who tapped both upward and downward and obtained an increase in yield of 60% at the cost of doubling the bark consumption. In 1924, Herbert Ashplant, then Rubber Specialist in South India, conducted experiments in upward tapping and showed tested trees to Ceylon planters visiting the South India Experimental Station at the time. Since rubber production was being restricted, nothing further was done in this direction. But when late in 1941 Malaya's danger be-

came apparent, Mr. Ashplant brought his system to the notice of rubber interests in Ceylon.

It seems that someone has patented the system in Ceylon, but the Attorney-General has filed a petition for revocation of the alleged patent on the grounds of prior publication and use.

In upward tapping, cuts are opened on virgin bark just above the level of the tapping panels; then shavings of bark are removed from the upper side of the cut so that the cut moves upward. The system is recommended only under special conditions, that is, for otherwise worthless trees and for slaughter tapping. It is doubted whether it could be used with advantage on trees to be kept in tapping indefinitely.

Bicycle Tire and Tube Plant Wanted

The Committee of Labor, Industry, and Commerce recently decided to recommend that the Ceylon Government consider the desirability of establishing a bicycle tire and tube factory here, and that in the event the government accepted the proposal, A. Sunderalingam be engaged as rubber technologist. Dr. Sunderalingam, a chemist of the Rubber Producers' Research Association, had received a scholarship from the government which included training in the manufacture of rubber goods in a suitable factory in Britain. Apparently he is a man of exceptional ability and has received handsome offers of employment from both British and Indian interests.

MALAYA

The Ministry of Supply and Aircraft Production informed the House of Commons last December that 24,311 tons of rubber had been bought from the Custodian of Enemy Property in Malaya. Of this amount 16,484 tons were said to have been shipped to the United Kingdom. Toward the end of last year, it was reported that a further 8,000 tons of rubber had arrived in Liverpool from Malaya.

The Colonial Office not long ago announced the appointment of committees to prepare reports on the condition of properties in Malaya, at the same time warning that until these reports were released, statements not based on information from official sources should be accepted with reserve. The committees were stated to be in Malaya already and to include an inspection committee for the rubber industry appointed by the Malayan Rubber Estate Owners' Co., Ltd., London.

A Scottish Section of the Incorporated Society of Planters in Malaya was formed in the beginning of this year following the decision of a meeting held in Edinburgh, Scotland. The Chairman is John Edward Pearce, who was a planter in Malaya for 22 years.

INDIA

Research in industrial chemistry and into the chemical utilization of India's raw material is apparently to be carried out on a substantial scale in the new National Chemical Laboratory to be built at Poona. The laboratory and auxiliary buildings will occupy 180,000 square feet of floor space, and it is estimated that the staff will number 350 persons. The study of rubber science is to be included in the work at the laboratory.

Experiments conducted in India indicate that ordinary jute-mill waste can be converted into a thermosetting powder which becomes moldable when a little plasticizer is added and the whole is subjected to a pressure of 300 pounds per square inch at a temperature of 150° C. for three minutes. The name of Jutelite has been given to the product, which is claimed to be very light in weight, to have a high gloss, and to be tough enough to stand drilling without cracking. The material, which apparently can be produced at a relatively low cost, is now being tested to determine its exact physical and chemical properties.

NEW ZEALAND

Details of New Zealand import licensing allocations for 1946 issued by the Board of Trade point to the exclusion of a variety of rubber goods from countries outside the British Empire. Allocations for imports from the United Kingdom and Crown Colonies only will, unless otherwise indicated, be granted for rubber floorings, up to 150% (from all sources) of imports in 1945; rubber bathing caps, up to 100% of 1941 imports; flexible hose, tubing or piping (other than canvas), etc., up to 100% of 1945 imports; water beds and cushions, ice bags and caps, wholly or mainly of rubber, up to 100% of 1944 imports. Allocations for imports from the United Kingdom, Crown Colonies, and other British countries will be granted for: elastic of all kinds, waterproof material in the piece, washers (other than those wholly of rubber) up to 100% of 1945 imports; driving belts and belting, up to 100% of 1945 imports (except Canada). Allocations for imports from the United Kingdom and Australia only will be granted for tire valves and caps, up to 100% of 1945 imports.

Allocations for imports from all sources will be granted for rubber gloves, including surgeons' gloves, up to 100% of 1941 imports. Individual consideration will be given to applications for rubber-soled canvas footwear, galoshes, and the like; hot water bags and bottles of rubber; rubber or gutta percha solutions and cements; tennis balls; rubber (excluding sponge rubber) in sheet, strip; plastic and synthetic resin molding powders.

No allocation is made regarding: heels, knobs, soles of rubber; flexible hose tubing, wholly of rubber; tires and tiring for baby carriages; tires for bicycles, tricycles; inner tubes for pneumatic tires not exceeding 1¾ inches in diameter; molded rubber strip for tire repairs and rubber tire repair outfits; and washers wholly of rubber.

No indication could be given regarding allocations of various items including pneumatic tires and inner tubes and solid rubber tires.

AUSTRALIA

The development of Australia's rubber industry in recent years has been proceeding at a greatly accelerated tempo with a resultant increase in self-sufficiency in this field. Already the Dominion is producing all the tires needed for the 750,000 locally registered automobiles and for the bicycle trade. During the war Australia not only provided the tires for her own service transport, but also most of those for the United States service transport in the South and Southwest Pacific areas.

In 1942-43 there were 260 rubber manufacturing establishments employing 7,200 persons, but the greater part of the output came from three manufacturers, two of whom have international affiliations, while the third is considered all-Australian.

Besides tires, locally produced rubber goods include: cushions, elastic ware, waterproof clothing, surgical supplies, household, engineering, and mining rubber goods, sporting goods, soling, toys, and novelties.

The value of imports of rubber and rubber manufactures into Australia in July came to £119,000, against £19,000 and £109,000 in the same month of 1944 and 1938, respectively. In August of 1945 and of 1944 the respective figures were £184,000 and £258,000. Exports of rubber and rubber manufactures (among the latter were included leather manufactures) totaled £127,000 in August, 1945, against £95,000 in the same month of the preceding year.

JAPAN

Among the various important plants that were more or less seriously damaged when Kobe was bombed is the Dunlop Rubber Plant. This factory was sold to Japanese interests before the war, but still goes by its English name. The main building is said to be well-constructed and suf-

fered little damage structurally although all except the ground floor was swept by fire. This factory, one of the three large rubber manufacturing establishments in Japan, is now said to be producing automobile tires from natural rubber, bicycle tires from reclaimed rubber, and a variety of smaller articles including hot water bottles and gloves.

SYRIA AND LEBANON

The imports of rubber articles into Syria and Lebanon in 1944 totaled 788.1 metric tons, value at £ SL 3,035,411, as compared with 166.9 metric tons, valued at £ SL 886,885, in 1943. (One Syrian L=$0.46.) The 1944 imports included 630.4 metric tons of automobile tires, valued at £ SL 2,582,403, and 61.7 metric tons of inner tubes, valued at £ SL 305,040, nearly all of which were supplied by Great Britain.

AFRICA

In reply to questions in the House of Commons, the Secretary of State for Colonies recently revealed that from January 1, 1942, to September, 1945, about 3,200 tons of rubber above normal had been produced in East Africa. This increase was almost entirely due to outputs from Tanganyika estates which were derelict before the war. The cost of production on the derelict estates is estimated to have been 1s.8d. a pound. So long as the shortage of natural rubber continues, all the rubber that can be obtained from East Africa will have to be taken.

The war was practically over in Europe before synthetic rubber supplied by America began to be used in South Africa. Until then wild rubber obtained from Central Africa was chiefly employed in the local manufacture of tires, but now most of the small-size tires are of synthetic materials. Hundreds of thousands of these tires have been running here in all temperatures and under all conditions so that the synthetic tires have had a fairly thorough test, and South African military authorities agree that the synthetic is a very fair substitute for the natural article.

Incidentally, the South African Provision Office, organized during the war to handle war supplies ordered in South Africa by the British Government, has shipped 750,000 tires of all sizes from Durban since 1941. Toward the end of last year 2,500 giant tires were shipped to India.

Although curtailment of military orders from local factories will make available a considerably larger number of tires to civilians, it is understood that tire rationing is not likely to end before the middle of this year. It is intended to make removal of rationing a gradual process; as a start, there has been some relaxation in control of buying and selling tires. Meanwhile large numbers of tires are being retreaded. One firm in Cape Town reported 2,000 tires retreaded monthly for local vehicles; while more than 2,000 tires came in for retreading from the country districts.

In an earlier issue, mention was made of the tire factory the Goodyear Tire & Rubber Co. (S.A.), Ltd., proposes to build at Uitenhage. At first there were a few snags, but these have now been removed, and the company is definitely to establish its headquarters at Uitenhage, as originally announced. On a 60-acre site a factory employing 400 to 500 persons is to be erected at an estimated cost of £330,000.

It has just become known that the United States Rubber Export Co., Ltd., may also build a new rubber factory. A £1,250,000 factory would be erected at Port Elizabeth, which is close to Uitenhage, where not only tires and tubes would be manufactured, but also canvas rubber-soled shoes and rubber products for industrial and mining uses, including belting and hoses. If the project is decided upon, it is expected to be able to start building soon so that produc-

tion can start early in 1947. According to H. G. Kieswetter, recently arrived in Port Elizabeth from New York, the factory will employ 800 persons when in full production. Once South African demand has been met, it is planned to develop a big export trade with the Rhodesias and Central Africa. With the exception of some American technicians who will be needed at the beginning, South African labor will be used exclusively.

Apropos of the export plans of the United States Rubber Export Co., it may be mentioned that in the first eight months of 1945, Southern Rhodesia imported leather, rubber, and rubber manufactures to a total value of £381,877, against £330,313 in the same period of 1944.

EUROPE

GERMANY

Because compounds, even when made with different kinds of Buna, outwardly look alike, usually being black in color, confusion often results, and one type is mistaken for another. To overcome this difficulty to some extent P. Kluckow, of the Staatliches Materialprufungsamt, gave[1] some hints on how to identify the different Bunas by simple means and with comparative speed. From a detailed abstract of this article [2] we cull the following:

Specialists are usually able to distinguish the different qualities of crude rubber either by form, color, or odor. Natural rubber comes in the form of sheets—either smoked or crepe. Bunas also come in sheet form, but in rolls, and the surface is differently grooved. The color of the crude material varies according to the type, but this indication is not always very accurate as light may modify the original color. Nevertheless it may be noted as distinguishing characteristics that Buna S is brownish purple in color, and Buna SS light brown; both types are deeply grooved; Buna SS has in addition markings in the form of small ellipses. Perbunan and Perbunan extra are both light yellowish-brown and lightly grooved; Perbunan extra has also markings in the form of angles. Buna 85, the most frequently used of the number Bunas, is a viscous, transparent, sticky mass. At rest, it gives a compact block of indeterminate shape. The other Bunas are always in the form of sheets or, in some cases, in the form of a friable mass.

The milling properties also give some indication as to their identity. Neither the Buna S, SS, or Perbunan sheets have the adhesiveness of milled rubber. Only Buna 85 mills to a homogeneous mass, but its odor plainly distinguishes it from natural rubber.

With Buna S (depolymerized to Defo 1000 for instance) a continuous sheet around the cylinder is obtainable only with great difficulty. Buna SS rather easily yields a continuous sheet; while Perbunan rapidly gives a smooth sheet. With Buna 85 a sheet which sticks to the rolls is immediately obtained.

If milling is not possible at the time when it is desired to identify the Buna, strips of the material may be placed in benzene; Buna S, Buna SS, or Buna 85 will swell in the benzene, but Perbunan will show no alteration in volume if left in benzene one night. If the material is in a friable form, the test may be carried out in test tubes.

The difference in rebound elasticity is a means of distinguishing Buna S from Buna SS; to this end, a mix is prepared of 100 parts of material (Defo 750), 5.0 of zinc oxide, 1.5 of sulphur, 1.2 of Vulkacit AZ, 1.0 of stearic acid, 5.0 of Naftolen ZD, 88 of Kaolin (40% by volume), and this is vulcanized for 30 minutes at $3 kg/cm^2$ (272° F.). This is then tested for rebound elasticity, and if the value is 53-54%, the material is Buna S, and if 27 to 28%, Buna SS.

Tensile strength is also a means of identification. It would be 40 kg/cm^2 for Buna S and about double for Buna SS.

[1] Kautschuk, Mar-Apr., 1944.
[2] Rev. gén. Caoutchouc, July, 1944, p. 142.

Probably because of the variability of Bunas, it is pointed out that the above figures have only a relative value and in the case of milled rubber may not always be useful. In that case the nitrogen content sometimes furnishes a helpful clue. Thus Perbunan contains 6.5 to 7.5%; Buna S and Buna SS, 0.02%; natural rubber 0.4%. It is understandable that in the case of compounds the difficulty of identification increases with the increase in the proportion of fillers and is almost impossible when large amounts of factice or reclaim have been incorporated.

As to the newer types of Buna:

Buna SSGF, used chiefly for articles coming in contact with food products, can be confused with Buna SS. In most cases, except in the specific use mentioned above, this point is not important. The same more or less applies to Buna SSE, chiefly used for the manufacture of sanitary goods and also in cements.

Buna SR is equal to Buna S in its resistance to cold; it is easier to process than the latter, but not so easy as Buna SS; it also is less elastic. With this Buna it is necessary to make very accurate determinations of mechanical properties if confusion with the other Bunas is to be avoided.

Buna SW is a much softer polymer than the others, in this respect resembling Buna 85. However it is rather easily distinguished from the latter in the crude state. After vulcanization, the Buna SW articles differ chiefly from those made from Buna 85 in their superior resistance to cold and abrasion; they are also stronger.

NETHERLANDS

A. van Rossem, director of the research department of the Rubber Foundation in Delft, and his family, came through the ordeal of the German occupation in comparatively good order. He recently visited England for a short time during which he met an old friend, P. Schidrowitz, well-known British chemist and regular contributor to *The India Rubber Journal*, who reported the news to the industry.

By all accounts, the commercial fair at Utrecht is to be held again this spring. It is expected that it will replace the widely attended fair formerly held at Leipzig, Germany, since many firms which used to exhibit in Germany are understood to have arranged to participate in the Dutch fair. Among the various exhibits from foreign countries will be featured goods needed for the repair of devastated areas, as building materials, machinery, tools, and implements. The Netherlands Section will demonstrate that the country is once more in a position to export and that it is also able to produce goods of the type formerly largely exported by Germany in prewar days, such as toys and electrical products of a quality at least equal to that of the German articles.

FRANCE

C. M. Blow submitted a paper on "The Production of Positive Latex; Its Applications in the Rubber Industry," at the Rubber Congress held in Paris in May, 1940. It may be recalled that Mr. Blow had, under the auspices of the Wool Industries' Research Association and the British Rubber Producers' Association, carried out research work on improving the properties of wool by treating with latex, as a result of which he had developed a process for reversing the electrical charge of the latex particles in alkaline media to positive, by means of cationic soaps.

In the introductory portion of the above paper Mr. Blow mentioned other methods of treating textiles and textile fibers with latex, including the process developed by Bongrand and Lejeune for their Filastic yarn, in which, according to Mr. Blow, the inventors had "surmounted the difficulties of penetration by treating the textile yarns in the untwisted state, and subsequently carrying out the twisting operation. In this way good impregnation of the yarn was effected. The authors indicate a content of 50% to 100% (of rubber) on the weight of the yarn."

The unfortunate developments that occurred in June, 1940 obviously account for the fact that more than two years passed before Revue Générale du Caoutchouc saw its way to publishing the article in question, which finally appeared in the issue of September, 1942. Then in the issue of January, 1943, appeared a note by J. Ch. Bongrand on Blow's article:

"The Filastic yarns", said M. Bongrand, "do not necessarily have a high rubber content (50% to 100% of the weight of the yarn, as Blow indicates); the textile of which they are composed, as is provided in the patents, may be of vegetable, animal or mineral origin, it may be natural or artificial (rayon, for instance). Furthermore, the aqueous dispersion used may be natural (latex) or artificial (coagulated rubber or dispersed reclaim); the dispersed rubber may itself be either natural or artificial.

"The patented Filastic processes include not only the manufacture of yarns, but also of finished goods, like belts, joints, soles, brake linings, etc., in which the textiles may be either in the form of fibers or yarns. The registered trade mark 'Fibrolastic' serves to designate the unwoven material.

"The thorough impregnation and the intimate union of the fibers and rubber resulting from the coating of each fiber, are not obtained solely because the yarns are treated in the untwisted state, as Mr. Blow indicates.

"As I have already explained on several occasions, the Filastic processes include: the adjustment of the pH (pH of the fibers and pH of the impregnation bath); impregnation, which is effected either by simple dipping or by means of a vacuum and pressure: by ripening: an operation which aims at: (1) prolonging the contact of the fibers with the impregnation bath, by which penetration is improved, since the latter is a function of the duration of contact; (2) fixing the rubber on the fibers by immobilizing it in the gel state, without which—contrary to Mr. Blow's statement—far from being fixed onto the fibers like a dye, the rubber in the latex state runs off the hanks and reels; by coagulation, which, by its contracting effect, improves penetration and the union of the rubber with the fibers.

"The adjustment of the pH (pH of fibers and pH of impregnation baths) which is the subject of numerous patents both in France and abroad, includes as specific case, the reversion of the charge of the rubber particles in the *Hevea* latex in order to obtain a positive latex.

"The increased resistance to traction of the yarns due to their impregnation, irrespective of the nature of the textile—cotton, wool, asbestos, rayon, etc.—as well as the possibility of reducing the amount of twist to obtain the same resistance to traction, are covered by claims of the Filastic patents, as well as the increased resistance to abrasion of the fabrics obtained with these yarns.

"The processes described by Mr. Blow seem to be antedated by the Filastic patents and I make all reservations in this respect.

"In addition, I take this opportunity to point out that in France certain manufacturers use the processes protected by the Filastic patents in the production especially of belting.

"I intend to reserve all my rights and assert them at the proper time."

Editor's Book Table

BOOK REVIEWS

"Why? Why Has America No Rigid Airships?" P.W. Litchfield and Hugh Allen. Corday & Gross, Cleveland, O. Cloth, 6 by 9 inches, 144 pages. Price $2.

This volume, co-authored by the chairman of the board of Goodyear Tire & Rubber Co., attempts to prove that airships can fill a definite place in our country's air program. A review is given of the history and development of the big lighter-than-air Zeppelins, with analyses of previous disasters to show that they have no reflection on the inherent strength of the airship itself. New wartime developments with Navy blimps are discussed, together with constructional and terminal facilities available. There are cost comparisons for passenger and freight transportation by both airship and plane, and many illustrations are included to show the need of airship lines in addition to present and proposed airplane and steamship transportation systems. The authors advocate the construction of a commercial airship having a helium capacity of 10 million cubic feet. A ship of this size can be constructed and serviced with available facilities and would obtain maximum benefit from the long range and large cargo capacity inherent in airships. Passenger and cargo floor plans are given for such a ship, together with data on speeds, flights, load carrying characteristics, and costs.

"Glycerin. Its Industrial and Commercial Applications." Georgia Leffingwell and Milton A. Lesser. Chemical Publishing Co., Inc., Brooklyn 2, N. Y. Cloth, 5½ by 8½ inches, 302 pages. Price $5.

This book is a comprehensive survey of glycerin and its many industrial applications. Starting with a review of the history of glycerin, the book in succeeding chapters covers the use of glycerin in a particular branch of industry and contains a discussion of the properties of glycerin which make it useful for each industry discussed. Fields of application, as given in chapter headings, include adhesives and cements, cleaners and polishes, electrical equipment, explosives, leather, lubricants, metals, packaging materials, paper, photography, plastics, printing and lithography, protective coatings, rubber, textiles and dyes, tobacco, glass, agriculture, cosmetics, beverages, foods, medical and surgical, oral and dental, pharmaceuticals, veterinary medicine, and optometry. Each chapter gives a general discussion and includes various formulae with their specific characteristics. A bibliography of detailed information on methods and formulae is given in each chapter.

Of special interest are the chapters on applications in the plastics and rubber industries. The section on plastics discusses the use of glycerin in alkyds, urea formaldehyde and alkyd resin combinations, urea formaldehyde and glyceryl phtalate resin combinations, the shaping of acrylics, and use in polyvinyls and phenol formaldehyde resins. For rubbers, there is a discussion of the value of glycerin as a plasticizer, tackifier, rubber finish, lubricant, preservative, and tire cord impregnant in various specific applications.

Following the chapters on applications, are others on glycerin derivatives, a listing of glycerin uses, tables of properties, and a comprehensive index.

This book should be valuable as a practical reference on formulation and utilization of glycerin. Although intended primarily for the industry members, it is written in a simple and clear style that should render it understandable to non-technical readers.

"Cotton Year Book of the New York Cotton Exchange, 1944." Prepared under the direction of Elmer S. Bonner. New York Cotton Exchange, 60 Beaver St., New York 4, N. Y. Cloth, 6 by 9 inches, 124 pages.

The seventeenth "Cotton Year Book" contains several new tables on subjects of interest to the cotton trade, in addition to such of those series of statistics given in previous editions and extended to cover the 1943-44 season. Included in the new material are a history of government loan programs, month-end stocks of government controlled cotton, and data on total and per capita consumption of cotton and other apparel fibers in the United States.

NEW PUBLICATIONS

"Velón Plastics by Firestone." Firestone Industrial Products Co., Akron, O. 12 pages. This booklet gives general properties of the Velón plastics together with illustrations of their applications. The use of Velón yarns and fabrics is shown for drapes, upholstery, furniture covering, and coverings of all types. Velón screening for use in homes as a decorator's tool is illustrated. The film form, Velofilm, is shown for use in rainwear and as a packaging material for wide application. The plastic leather, Veloflex, for use in luggage, bookbinding, shoes, and upholstery, is also illustrated.

"Pentalyn A and Pentalyn H—Tackifiers for Neoprene and GR-S Latex Adhesives." Hercules Powder Co., Wilmington, Del. 6 pages. This technical bulletin describes two tackifying resins particularly applicable in pressure-sensitive adhesives, based on synthetic rubber, which are characterized by their excellent ability to withstand delamination at elevated temperatures. In addition to the two Pentalyns, data on Staybelite Ester 10 and Hercolyn are also given for comparison in this bulletin, which includes charts of physical and chemical properties and typical formulae for spontaneous resin emulsions and for resin emulsions for use in latex adhesives.

"Dillon Universal Tester." Bulletin No. 142. W. C. Dillon & Co., Inc., Chicago, Ill. 8 pages. This illustrated bulletin describes the Model K Dillon universal tester. It comes in seven capacities from 0-250 to 0-10,000 pounds, and its interchangeable grips, dynamometers, and other accessories make it suitable for use on a wide variety of materials and all shapes of test specimens. Supplementing the bulletin, free specimen charts are offered up request.

"The Neoprene Notebook." No. 35. January, 1946. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This issue discusses "Outdoor Sunlight Aging Performance of Commercial Neoprene Compositions," the use of neoprene in a new collet and chuck, a conveyer belt, as a shaft seal, as a jacket for a new telephone drop wire, and in packing rings for an oil well testing apparatus. The issue concludes with a section on questions and answers on the use of neoprene.

"Alcohols." Carbide & Carbon Chemicals Corp., New York, N. Y. 28 pages. One of a series on organic chemical groups, this booklet lists properties, specifications, shipping data, and general information on the uses of alcohols. Graphs are included showing the variation of important properties with respect to temperature, the properties of alcohols in aqueous solutions, evaporation rates, and solvent power in combination with other solvents. A compilation of constant boiling mixtures and a handy bibliography help make this publication suitable for reference use.

"Coated Fiberglas Cloths." Owens-Corning Fiberglas Corp., Toledo 1, O. 4 pages. Synthetic rubbers, vinyl compounds, synthetic resins, and other materials are being used for coating Fiberglas cloth, resulting in a textile material possessing a combination of characteristics and properties suited for a virtually unlimited field of application. Three samples of coated Fiberglas are enclosed in the booklet, including neoprene-coated, vinyl-coated, and neoprene and aluminum pigment on cloth. Applications illustrated cover tents, tarpaulins, curtains for vehicles, high-temperature conveyer belting, welding curtains, shower curtains, lithographers' blankets, hose, and many others.

"VA-3 in Non-Blooming GR-S Camelback and Cushion Stocks." Technical Service Bulletin No. 28. Thiokol Corp., Trenton, N. J. 1 page. This bulletin describes Thiokol VA-3, a liquid polymer containing organically combined sulphur which is available for vulcanization. This combined sulphur does not bloom from uncured or cured stocks, and the blooming characteristics are not affected by processing temperatures. Some formulations are given for its use in camelback and cushion stocks, and properties of the vulcanizates are shown for several curing cycles.

"Note on the X-Ray Investigation of the Calender Effect in Rubber Sheets." J. M. Goppel and A. van Rossem. Communications of the Rubber Foundation, Delft, Holland. No. 33, May, 1942. 4 pages. Rubber sheets were calendered with slight and strong calender effects. X-ray diagrams do not show any crystalline structure two days after calendering. X-ray reflections were developed gradually; the sheet with strong calender effect shows the reflections much sooner and more intensely than the sheet with the slight calender effect.

"Vinylite Plastics—Elastomeric Compounds." Bakelite Corp., New York, N. Y. 18 pages. This profusely illustrated booklet discusses molding and extrusion compounds, flexible sheeting and film, and cloth coating compounds made of elastomeric Vinylite plastics. Descriptions of properties are given, together with a review of applications and illustrations of uses in many different fields. A comparative chart of properties of the various compounds is included.

"Compounding Materials Used in the Rubber Industry (Classification and Health Hazards). Part 1—Accelerators, Antioxidants, and Retarders." Rubber Section, National Safety Council, Chicago, Ill. Industrial Safety Series No. Ru. 1—Part 1. 12 pages. This booklet lists chemicals and trade names, with chemical compositions, of many accelerators, antioxidants, and retarders used in the rubber industry, together with a description and classification of the health hazards according to defined classifications. The information is based upon data from questionnaires submitted to manufacturers and users of the compounds, and from available published material. A list of references to the literature is appended.

"Chemaco Molding Materials." Chemaco Corp., Berkeley Heights, N. J. 20 pages. This booklet describes the company's four thermoplatsics: cellulose acetate, ethyl cellulose, polystyrene, and vinyl compounds. In addition to general information, tables of properties and typical and suggested applications are given for each of the plastics, with illustrations of uses. Included are a section on molding methods and tables of comparative properties of different materials. Several useful reference tables are also given.

Bulletins of Stanco Distributors, Inc., 26 Broadway, New York, N. Y. **"High Quality Automotive Compounds."** Tentative Supplement No. IV, Section No. IX. 2 pages. Two Perbunan 26 formulations for automotive compounds are given, together with physical properties before and after various aging and oil immersion tests. **"Perbunan Compounds for Low Hysteresis."** Tentative Supplement No. V, Section No. IX. 3 pages. Formulations, curing cycles, and physical properties are given for four Perbunan 26 compositions to show how low hysteresis properties and good resiliency may be obtained with two types of acceleration and with two types of carbon black.

"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials." December, 1945. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. 40 pages. **"Don't Cook the Goose That Lays Your Golden Eggs."** The Dayton Rubber Mfg. Co., Dayton, O. 8 pages. **"Hewitt Hose,** Job-Engineered for Industry." Hewitt Rubber Corp., Buffalo 5, N. Y. 32 pages. **"List of Inspected Gas, Oil, and Miscellaneous Appliances."** November, 1945. Underwriters' Laboratories, Inc. 160 pages. **"150 Years of Steel Making."** Baldwin Locomotive Works, Burnham, Pa. 20 pages. **"The Prater Dual-Screen Pulverizer** in the Process Industries." Prater Pulverizer Co., Chicago, Ill. 16 pages. **"Red Cross**—A Force for Peace." Basil O'Connor, Chairman, The American National Red Cross. 16 pages. **"Red Giant Liftruck,"** and **"Revolvator."** Revolvator Co., Tonnele Ave., North Bergen, N. J. 4 pages each. **"Rubber Industry in India."** N. N. Godbole, All-India Manufacturers Organization, Bombay, 1944. 24 pages. "Tape; Rubber (and Synthetic Rubber) Insulating." Federal Specification HH-T-111 b, March 28, 1945. Superintendent of Documents, Washington, D. C. 5¢.

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Vibration Test Table

(Continued from page 804)

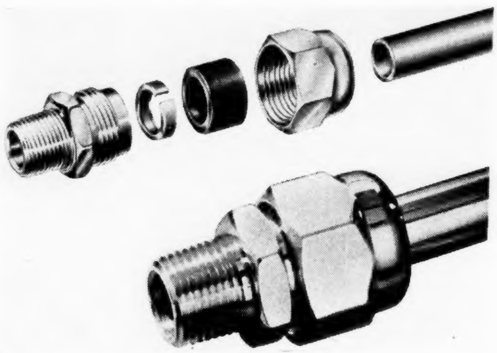
with frequency. An acceleration of 10 Gs is produced between 50 and 60 cycles per second at 1/8-inch double amplitude. The equipment, which has a maximum capacity of 400 pounds, weighs 1,500 pounds and is operated by a 5 h.p. motor. The table top is 24 by 40¾ inches, and overall dimensions are 52 by 58 by 32 inches high. Installations can be made on upper floors of buildings without concrete bases. L.A.B. Corp.

Flexigrip Tube Fitting

(Continued from page 865)

The tubing end is inserted into the body as far as it will go, and the nut tightened. This tightening compresses the ring into a tight grip and molds the gasket around the ring to make a leakproof seal that is flexible enough to withstand unusual vibration or impulse.

Elimination of flaring, swadging, or soldering of the tube end adds considerable strength to the joint as well as saves time and labor. Economies in time and material are also considerable over the collar, ring, or ferrule type of tube-end fitting.



(Top) Component Parts of Flexigrip Coupling; (Bottom) Coupling Applied

Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Dec. 29	Jan. 26	Feb. 2	Feb. 9	Feb. 16	Feb. 23
March	24.63	25.17	25.24	25.90	26.41	26.52
May	25.59	25.13	25.26	25.94	26.45	26.42
July	24.43	25.08	25.24	25.90	26.48	26.38
Sept.	23.95	24.80	25.10	25.74	26.32	26.31
Dec.	23.66	24.58	24.98	25.71	26.20	26.25
Feb.	23.55	24.53	24.94	25.63	26.18	26.23

THE market recorded higher prices for cotton this month than for any period since the 1924-1925 season. General inflationary forces seemed mainly to influence the demand for contracts. Further factors in the advance were the general expectation that the impending changes in the wage-price policy would result in higher ceilings on most goods including cotton textiles, also the fact that reports indicate that the farm bloc may renew its effort to effect a revision of the parity price formula, the belief that consumption is expected to increase in the near future, and reports that about 1,000,000 bales of government controlled cotton may be shipped to Japan and China in the coming months.

The price of April futures fluctuated until they rose from a low of 25.18¢ a pound on February 1, to a 22-year peak of 26.46¢ a pound on February 15. The market then scored new highs and closed at 27.00¢ a pound March 2.

The 15/16-inch spot middling price recorded on February 1 was 25.83¢ a pound, the low for the month. The price then advanced and on February 15 scored the 22-year high of 27.05¢ per pound, finally closing at 27.64¢ a pound on March 2.

Though reports indicate that farmers intend to plant ground equal to the Department of Agriculture's goal of 20,200,000 acres, it seems unlikely that the plan will be realized in lieu of the shortage of manpower, machinery, seed, and the poor weather conditions for planting.

As yet the major cotton producing and importing nations of the world have not been able to agree on a basis for international cooperation designed to stabilize prices and production and to divide markets for the commodity; however the International Cotton Advisory Committee is to continue discussions in Washington to this end.

Fabrics

Manufacturers remained in withdrawn positions last month and planned to continue to do so until ceiling increases are granted that will cover the rise in raw cotton and labor costs. Production is seriously threatened unless OPA steps in and offers some relief because many mill men are now contemplating return to the 40-hour week and the elimination of extra-shift operations.

Countering to charges made by cotton men that the government had given rayon manufacturers an unfair advantage over cotton by subsidizing the rayon industry, the rayon trade stated that the increased use of rayon resulted in the savings of 32,400,000 pounds of rubber and the manufacture of an additional 1,573,000 tires of all types. This critical saving in rubber was made because rayon tires are said to consume 10-15% less rubber than conventional types. The principal rise in the 1945 increase in rayon yarn was in the viscose filament yarn due to the greatly expanded output of high tenacity yarn, the great bulk of which is used to make tire cord and fabric. One hundred and ninty-five million pounds of rated high-tenacity viscose yarn were shipped by producers during 1945, compared with the 1941 shipment of 18,000,000 pounds.

The chief limiting factor in the manufacture of most rubber items, according to the CPA is the cotton fabric shortage. This shortage is curtailing the production of mechanical goods, footwear, coated materials, and certain other goods. It is serious but not critical in tire production. Supplies of chafer fabrics used in making tire beads are extremely tight, but are sufficient to maintain tire production at its present level.

The set-aside of 55% of all osnaburgs for the bag industry leaves only 45% to be apportioned among rubber manufacturers, book binders, manufacturers of plastic-coated articles, and hundreds of other users.

There is also a 55% set-aside on class A and B cotton sheetings which are widely used in the manufacture of rubber products, including rubber soled canvas shoes.

With a surplus of cotton, government experts are seeking the solution to getting the cotton woven into fabric. Formation of an inter-agency committee has been proposed, but as yet no decision has been made.

Changes in the prices of drills, ducks, and osnaburgs have been made and are given in the accompanying price list.

As we were going to press, word came of the proposed cotton textile price increases to be granted manufacturers which should change the policy of withholding and integrated mill operations featured in the market for some time.

In order to get mills back into the production of low-cost fabrics, the CPA proposes to require that any mill which has engaged in the production of these materials at any time during the past five years and which is now engaged in the manufacture of less needed goods must now resume manufacture of the selected constructions. A flat 5% bonus is being granted. This measure, if put into effect, should insure adequate supplies of fabric for mechanical rubber goods, tire, and electrical wire insulation manufacturers.

New York Quotations March 2, 1946

Drills		
38-inch 2.00-yard	yd.	$0.195
50-inch 1.52-yard		.3075
52-inch 1.85-yard		.25293
52-inch 2.20-yard		.2170
59-inch 1.85-yard		.28
Ducks		
38-inch 2.00-yard D.F.	yd.	.24375
40-inch 1.45-yard D.F.		.31125
51½-inch 1.35-yard D.F.		.36125
72-inch 1.05-yard D.F.		.4825
Mechanicals		
Hose and belting	lb.	.46
Tennis		
51½-inch 1.35-yard S.F.	yd.	.35375
51½-inch 1.60-yard D.F.		.31125
Hollands—Rubber		
20-inch	yd.	.1225/.145
30-inch		.22 /.2575
40-inch		.245 /.29
Osnaburgs		
36-inch 2.94 Cl.	yd.	.1373
40-inch 2.11 P.W.		.1766
40-inch 2.65 Cl.		.15219
40-inch 3.65 Cl.		.11768
Raincoat Fabrics		
Cotton		
Bombazine 64 x 60, 5.35	yd.	.1375
Bombazine 64 x 56, 5.50		.1350
Print cloth, 38½-inch, 64 x 60.		.9636
Sheeting, 40-Inch		
48 x 44, 5.00-yard	yd.	.182
64 x 68, 3.15-yard		.15555
56 x 60, 3.60-yard		.13333
44 x 40, 4.25-yard		.10941
Sheeting, 36-Inch		
48 x 44, 5.00-yard	yd.	.96
40 x 40, 6.15-yard		.7804
Tire Fabrics—Karded Peeler		
Builder		
17¼ ounce 60" 23/11 ply	lb.	.48
Chafer		
14 ounce 60" 20/8 ply	lb.	.48
9¼ ounce 60" 10/2 ply	lb.	.45
Cord Fabrics		
25/5/3, 1 1/16" cotton	lb.	.44
15/3/3, 1 1/16" cotton	lb.	.42
12/4/2, 1 1/16" cotton	lb.	.42
23/5/3, 1¼" cotton	lb.	.44
Leno Breaker		
8¼ ounce and 10¼ ounce 60"	lb.	.45

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Guayule		
Guayule (carload lots)	$0.17½	$0.31
Latex		
Normal (tank car lots)	.26	.43½
Creamed (tank car lots)	.26¾	.44¼
Centrifuged (tank car lots)	.27¾	.45¼
Heat-Concentrated (carload drums)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

* For a complete list of all grades of all rubbers see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	/$0.04
Rottenstone, domestic	lb.	.025	/ .03

Accelerators, Inorganic

Lime, hydrated, l.c.l., N. Y.	ton	25.00	
Litharge (commercial)	lb.	.085	/ .09
Eagle, sublimed	lb.	.085	/ .09
FBS	lb.	.085	/ .09
Magnesia, calcined, extra light technical	lb.	.25	
Heavy technical	lb.	.05	/ .1275
Extra light U. S. P.	lb.	.26	
Medium light technical	lb.	.12	
Magnesia, light technical	lb.	.25	

Accelerators, Organic

A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .58
A-32	lb.	.59	/ .69
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator No. 8	lb.	.63	/ .65
49	lb.	.40	/ .42
552	lb.	1.63	
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Altax	lb.	.39	/ .41
Arazate	lb.	1.53	
B-J-F	lb.	.34	/ .39
Beutene	lb.	.59	/ .64
Butasan	lb.	1.10	
Butazate	lb.	1.10	
Butyl Eight	lb.	.97	/ .99
C-P-B	lb.	1.95	
Captax	lb.	.34	/ .1275
Cumate	lb.	1.60	
Cuprax	lb.	.60	/ .62
Di-Esterex-N	lb.	.50	/ .57
DOTG (Diorthotolyguanidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.35	/ .41
El-Sixty	lb.	.36	/ .43
Ethasan	lb.	1.10	
Ethazate	lb.	1.10	
Ethylidene Aniline	lb.	.42	/ .43
Ethyl Selenac	lb.	1.60	
Tuads	lb.	1.25	
Tuex	lb.	1.25	
Unads	lb.	1.25	
Formaniline	lb.	.36	/ .37
Goodrite Erie	lb.	.60	/ .62
Guantal	lb.	.39	/ .48
Hepteen	lb.	.34	/ .39
Base	lb.	1.25	/ 1.40
Lead Oleate Witco	lb.	1.75	
Ledate	lb.	1.20	
MBT	lb.	.34	/ .39
MBTS	lb.	.39	/ .44
Methasan	lb.	1.20	
Methazate	lb.	1.20	
Methyl Selanac	lb.	1.60	
Tuads	lb.	1.25	
Monex	lb.	1.25	
Mono Thiurad	lb.	1.25	
Morfex "33"	lb.	.60	/ .65
Novac	lb.	1.40	
O-X-A-F	lb.	.38	/ .43
Pentex	lb.	.74	/ .84
Flour	lb.	.1225	/ .1325
Phenex	lb.	.49	/ .54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
Polyac	lb.	1.25	
R & H 50-D	lb.	.42	/ .43
R-2 Crystals	lb.	1.55	
Rotax	lb.	.44	/ .46
Safex	lb.	1.15	/ 1.25
Santocure	lb.	.60	/ .67
Selazate	lb.	1.60	
Setsit 5	lb.	.90	
SPDX-G	lb.	.53	/ .58
SRA No. 2	lb.	.53	/ .55
Super-Sulphur No. 2	lb.	.13	/ .15
Tetrone	lb.	1.25	
A	lb.	1.85	
Thiocarbanilide	lb.	.28	/ .33
Thiofide	lb.	.39	/ .46
Thionex	lb.	1.25	
Thiotax	lb.	.34	/ .41
Thiurad	lb.	1.25	
Thiuram E	lb.	1.25	
M	lb.	1.25	
Trimene	lb.	.54	/ .64
Base	lb.	1.03	/ 1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuex	lb.	1.25	
2-MT	lb.	.58	/ .60
Ulto	lb.	.99	/ 1.04

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.
†Price quoted is f.o.b. works (bags). All prices are carlot.

Ureka	lb.	$0.50	/$0.57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	.42	/ .43
Z-B-X	lb.	2.45	
Zenite	lb.	.37	/ .39
A	lb.	.42	/ .44
B	lb.	.39	/ .41
Zimate, Butyl	lb.	1.10	
Ethyl	lb.	1.10	
Methyl	lb.	1.20	

Activators

Activex	lb.	.20	/ .22
Aero Ac 50	lb.	.46	/ .52
Barak	lb.	.50	
D-B-A	lb.	1.95	
Delac J	lb.	.50	/ .60
P	lb.	.39	/ .48
Dibenzo GMF	lb.	1.50	
GMF	lb.	1.95	
MODX	lb.	.295	/ .345
No. 2 RM Red Lead	lb.	.10	/ .105
Ridacto	lb.	.20	
SL-20	lb.	.1089	/ .1135

Alkalies

Caustic soda, flake, Columbia (400-lb. drums)	100 lbs.	2.50	
Liquid, 50%	100 lbs.	1.75	
Solid (100-lb. drums)	100 lbs.	2.10	

Antioxidants

AgeRite Alba	lb.	1.95	/ 2.05
Gel	lb.	.52	/ .54
H.P.	lb.	.53	/ .55
Hipar	lb.	.61	/ .63
Powder	lb.	.40	/ .42
Resin	lb.	.43	/ .45
D	lb.	.40	/ .42
Stalite	lb.	.40	/ .42
White	lb.	1.23	/ 1.33
Akroflex C	lb.	.53	/ .55
Albasan	lb.	.69	/ .74
Aminox	lb.	.40	/ .49
Antox	lb.	.54	/ .56
Aranox	lb.	1.95	
Betanox	lb.	.43	/ .52
B-L-E	lb.	.40	/ .49
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.40	/ .47
Flexamine	lb.	.53	/ .62
Neozone (standard)	lb.	.61	/ .63
A	lb.	.40	/ .42
C	lb.	.43	/ .45
D	lb.	.40	/ .42
Distilled	lb.	.45	/ .47
E	lb.	.61	/ .63
Oxynone	lb.	.77	/ .90
Parazone	lb.	.68	
Perflectol	lb.	.53	/ .60
Permalux	lb.	1.18	/ 1.20
Santoflex B	lb.	.40	/ .47
BX	lb.	.54	/ .61
Santovar-O	lb.	1.15	/ 1.40
Santowhite	lb.	1.23	/ 1.38
Solux	lb.	1.28	/ 1.30
Stabilite	lb.	.48	/ .50
Alba	lb.	.69	/ .74
Thermoflex	lb.	1.18	/ 1.20
A	lb.	.61	/ .63
C	lb.	.54	/ .56
Tysonite	lb.	.165	/ .1725
V-G-B	lb.	.43	/ .52

Antiscorch Materials

Cumar RH	lb.	.105	
E-S-E-N	lb.	.34	/ .39
R-17 Resin (drums)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445	/ .475
U-T-B	lb.	.34	/ .39
Vultrol	lb.	.50	/ .55

Antiseptics

Compound G-4	lb.	.95	/ 1.40
G-11	lb.	4.50	/ 4.75
Resorcinol	lb.	.64	

Antisun Materials

Antisol	lb.	.23	/ .28
Heliozone	lb.	.23	/ .24
S.C.R.	lb.	.32	/ .34
Sunproof	lb.	.2275	/ .2775
Jr.	lb.	.1625	/ .2125

Blowing Agents

Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175	/ .0185

Carbon Black

Conductive Channel—CC

Conductex A	lb.	.05	/ .085
Continental R20	lb.	.0455	
R40	lb.	.105	/ .14
Huber 35-C	lb.	.075	
Spheron C	lb.	.0455	
I	lb.	.0405	
N	lb.	.15	
Voltex	lb.	.105	/ .14

Hard Processing Channel—HPC

Continental F	lb.	$0.05†	/$0.0725
Huber HX	lb.	.05†	/ .0725
Kosmobile S/Dixie-densed S.	lb.	.05†	/ .0725
Micronex Mark II	lb.	.05†	/ .0725
Spheron No. 4	lb.	.05†	/ .0725
Witco 6	lb.	.05†	/ .0725

Medium Processing Channel—MPC

Arrow	lb.	.05†	/ .0725
Continental A	lb.	.05†	/ .0725
Huber TX	lb.	.05†	/ .0725
Kosmobile S-66/Dixiedensed S-66	lb.	.05†	/ .0725
Spheron No. 6	lb.	.05†	/ .0725
Standard Micronex	lb.	.05†	/ .0725
Witco 1	lb.	.05†	/ .0725

Easy Processing Channel—EPC

Continental AA	lb.	.05†	/ .0725
Kosmobile 77/Dixiedensed 77	lb.	.05†	/ .0725
Micronex W-6	lb.	.05†	/ .0725
Spheron No. 9	lb.	.05†	/ .0725
Witco 12	lb.	.05†	/ .0725
Wyex	lb.	.05†	/ .0725

Conductive Furnace—CF

Statex A	lb.	.08	/ .10
Sterling I	lb.	.09	

Fine Furnace—FF

Statex B	lb.	.07	/ .09

High Modulus Furnace—HMF

Continex	lb.	.16	
Kosmos 40/Dixie 40	lb.	.05	/ .075
Modulex	lb.	.05	
Philblack A	lb.	.05	/ .06
Statex 93	lb.	.05	/ .075
Sterling L	lb.	.05	

Semi-Reenforcing Furnace—SRF

Continex	lb.	.035	/ .055
Furnex	lb.	.035	/ .06
Gastex	lb.	.035	/ .06
Kosmos 20/Dixie 20	lb.	.035†	
Pelletex	lb.	.035	/ .06
Sterling	lb.	.035†	
Witco	lb.	.035	/ .055

Fine Thermal—FT

P-33	lb.	.04	

Medium Thermal—MT

Thermax	lb.	.0225	

Colors

Black

Lampblack (commercial), l.c.l.	lb.	.12	/ .14

Blue

Du Pont	lb.	.90	/ 3.95
Toners	lb.	.30	/ 3.50

Brown

Mapico	lb.	.1135	

Green

Chrome	lb.	.25	
Oxide (freight allowed)	lb.	.25	
Chromium Hydroxide	lb.	.70	
Du Pont	lb.	1.10	/ 2.85
Guignet's (bbls.)	lb.	.70	
Toners	lb.	.35	/ 4.00

Orange

Du Pont	lb.	2.35	/ 3.05
Toners	lb.	.30	/ 1.50

Red

Antimony Crimson, 15/17%	lb.	.48	
R.M.P. No. 3	lb.	.48	
Sulphur free	lb.	.52	
7-A	lb.	.37	
Z-2	lb.	.25	
Du Pont	lb.	.48	/ 1.65
Iron Oxide, l.c.l.	lb.	.07	/ .15
Mapico	lb.	.0885	/ .096
Rub-Er-Red (bbls.)	lb.	.0975	
Toners	lb.	.25	/ 4.15

White

Lithopone (bags)	lb.	.0425	/ .045
Albalith	lb.	.0425	/ .045
Eagle	lb.	.0725	/ .0750
Titanium Pigments Raycal	lb.	.055	/ .0575
Rayox LW	lb.	.145	/ .1525
R-110	lb.	.155	/ .1625
Titanox-A LO and MO	lb.	.145	/ .15
C	lb.	.055	/ .0575
Zopaque (50-lb. bags)	lb.	.145	
Zinc Oxide Azo ZZZ-11	lb.	.0725	/ .075
44	lb.	.0725	/ .075
55	lb.	.0725	/ .075
66	lb.	.905	/ .0975
Eagle, lead free	lb.	.0725	/ .0750
French Process, Florence Green Seal-8	lb.	.09	/ .0925
Red Seal-9	lb.	.085	/ .0875
White Seal-7	lb.	.095	/ .0975
Kadox, Black Label-15	lb.	.0725	/ .075
No. 25	lb.	.085	/ .0875
72	lb.	.0725	/ .075
Red Label-17	lb.	.0725	/ .075
Horse Head XX Special 3	lb.	.0725	/ .075
XX Red-4	lb.	.0725	/ .075
78	lb.	.0725	/ .075
156	lb.	.0725	/ .075
166	lb.	.0725	/ .075
St. Joe (lead free) Black Label	lb.	.0725	/ .075
Green Label	lb.	.0725	/ .075
Red Label	lb.	.0725	/ .075
U.S.P. No. 12	lb.	.105	/ .1075
Zinc Sulphide Pigments Cryptone ZS No. 800	lb.	.0825	/ .085

Yellow

Du Pont	lb.	$1.37	/$1.75
Mapico	lb.	.0685	/ .071
Toners	lb.	.50	/ 1.37

Dispersing Agents

Bardex	lb.	.0425	/ .045
Bardol	lb.	.02	/ .0275
B	lb.	.05	/ .0525
Darvan No. 1	lb.	.155	/ .30
2	lb.	.19	/ .30
Nevoll (drums, c.l.)	lb.	.02	/ .025
Triton R-100	lb.	.12	/ .25

Extenders

Advagum 1098	lb.	.42	
1198	lb.	.40	
Dielex	lb.	.055	/ .06
Alba	lb.	.45	
Extender 15	lb.	.32	
Extender C	lb.	.15	
Naftolen R-100	lb.	.10	/ .12
Oroplast H	lb.	.1125	/ .1175
L	lb.	.0725	/ .0825
M	lb.	.0825	/ .0925

Fillers, Inert

Aluminum Flake	ton	24.50	
Asbestos Fiber	ton	15.50	/48.00
Barytes	ton	25.55	/40.00
Off color, domestic	ton	29.00	
White, domestic	ton	38.50	/40.00
Blanc fixe, dry, precip	ton	80.00	
Calcene T	ton	37.50	/45.00
Kalite	ton	26.00	
Kalvan	ton	100.00	
Magnesium carbonate l.c.l.	lb.	.0625	/ .075
Pyrax A	ton	10.00	
W.A.	ton	11.50	
Whiting			
Suprex White (precipitated calcium carbonate)	ton	32.50	
Witcarb R-12	ton	32.50	
Witco, c.l.	ton	6.50	

Finishes

Mico, l.c.l.	lb.	.045	/ .055
Rubber lacquer, clear	gal.	1.00	/ 2.00
Colored	gal.	2.00	/ 3.50
Shoe Varnish	gal.	1.45	
Talc	ton	25.00	/35.00

Flock

Cotton flock, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Fabrifil X-24-G	lb.	.095	
X-24-W	lb.	.135	
Filfloc 6000	lb.	.16	
F-40-9000	lb.	.105	
Rayon flock, colored	lb.	1.00	/ 1.50
White	lb.	.75	/ 1.25

Latex Compounding Ingredients

Accelerator 89	lb.	1.20	
122	lb.	1.30	
Advawet	lb.	.46	
Aerosol (drums)	lb.	.35	
Antox, dispersed	lb.	.54	
Aquarex BBX Conc.	lb.	.70	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400, dry	lb.	.51	/ .65
Black No. 25, dispersed	lb.	.22	/ .40
Casein	lb.	.24	/ .2475
Collocarb (Dispersed Wyex)	lb.	.06	/ .07
Copper Inhibitor X-872	lb.	2.25	
Darvan No. 1	lb.	.30	/ .34
2	lb.	.30	/ .34
Dispersex No. 15	lb.	.11	/ .12
20	lb.	.08	/ .10
Factex Dispersion A	lb.	.185	
Marmix	gal.	1.35	/ 1.75
Micronex, Colloidal	lb.	.06	/ .07
Nevilloid C-55	lb.	.12	
pHR	lb.	1.25	
Resin V	lb.	.13	
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90	/ 1.10
B	lb.	.70	/ .90
C	lb.	.40	/ .50
Sulphur, dispersed No. 2	lb.	.08	/ .12
Tepidone	lb.	.63	
Zinc oxide, dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond, l.c.l.	ton	25.00	/30.00
B.R.C. No. 20	lb.	.0105	/ .0115
Hydrocarbon, Hard	ton	25.00	/27.00
Lode	lb.	.04	/ .045
MilliMar	lb.	.055	
Parmr	ton	21.00	/29.00
Pioneer, c.l.	ton	25.00	/30.00
Witco MR solid	ton	25.00	
Granular	ton	30.00	

Mold Lubricants

Aluminum Stearate	lb.	.23	/ .24
Aquarex D	lb.	.60	
MDL Paste	lb.	.25	
Colite	gal.	.90	/ 1.15
Dipex	lb.	.1275	/ .15
Glycerized Lubricant (concentrate)	gal.	1.50	
Lubrex	lb.	.25	/ .30
Rubber-Glo, conc. regular	gal.	.94	/ 1.15
Type W	gal.	.99	/ 1.20
Sericite	ton	65.00	
Soapstone, l.c.l.	ton	15.00	/35.00
Zinc stearate	lb.	.30	/ .31

Reclaiming Oils

B.R.V.	lb.	.03	/ .0375
BWH-1	lb.	.10	
C-10	gal.	.19	/ .24
D-4	gal.	.17	/ .22
E-5	gal.	.15	/ .20
No. 1621	lb.	.016	/ .0235
S.R.O.	lb.	.015	/ .0225
X-60 (reclaiming)	gal.	.20	/ .28
X-443	gal.	.20	/ .27

Reenforcers, Other Than Carbon Black

Buca	ton	40.00	
Carbonex Flakes	lb.	.03	/ .035
S	lb.	.031	/ .036
Plastic	lb.	.031	/ .0335
Clays			
Aerfloted Hi-White	ton	10.00	
Paragon	ton	10.00	
Suprex	ton	11.00	/23.50
Catalpo, c.l.	ton	30.00	
Champion	ton	11.00	/23.50
China	ton	25.00	
Crown	ton	11.00	/23.00
Dixie	ton	11.00	
Hydratex R	ton	20.00	
"L"	ton	10.00	
Langford	ton	8.50	
Magnolia	ton	10.00	
McNamee	ton	10.00	
No. 33	ton	30.00	
Par	ton	11.00	
Paraforce, c.l.	ton	50.00	
Witco, Nos. 1 and 2, c.l.	ton	25.00	
Cumar EX	lb.	.0525	
MH	lb.	.065	/ .1175
V	lb.	.0975	/ .1275
465 Resin	lb.	.035	
"G" Resin	lb.	.08	
Nevindene	lb.	.105	/ .135
Resinex	lb.	.0275	/ .0325
Silene "EF"	lb.	.055	/ .06
Silical	ton	65.00	/85.00
Witcarb R, c.l.	ton	100.00	

Reodorants

Coumarin	lb.	2.75	/ 3.25
Curodex 19	lb.	4.75	
188	lb.	5.75	
198	lb.	6.75	
Para-Dors (ABCDE)	lb.	.25	/ 4.00
Rodo No. 0	lb.	4.00	/ 4.50
10	lb.	5.00	/ 5.50
Vanillin	lb.	2.25	/ 2.95

Rubber Substitutes

Black	lb.	.09	/ .15
Brown	lb.	.105	/ .1875
White	lb.	.0975	/ .165
Factice			
Amberex Type B	lb.	.20	
Brown	lb.	.095	/ .19
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.10	/ .20

Softeners and Plasticizers

Abalyn	lb.	.0722	/ .0947
Ambidex	lb.	.23	
"S"	lb.	.23	
B.R.T. No. 7	lb.	.02	/ .021
Belro Resin	100 lbs.	2.71	/ 3.00
Bondogen	lb.	.55	/ .60
Bunnatol G	lb.	.40	/ .50
S	lb.	.40	/ .50
Butac	lb.	.085	/ .105
Butyl Roleate	lb.	.16	/ .195
Capryl Alcohol	lb.	.16	/ .195
Circosol-2XH Elasticator for GR-S	gal.		
Dibenzyl Sebacate	lb.	.67	/ .74
Phthalate	lb.	.51	/ .59
Dibutyl Sebacate	lb.	.46	/ .565
Dicapryl Phthalate	lb.	.25	/ .30
Dipentene	gal.	.56	/ .58
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375	/ .04
Duraplex C-50 LV, 100%	lb.	.25	/ .295
Dutrex 6	lb.	.025	/ .0375
Hercolyn	lb.	.1122	/ .1347
JMH	lb.	.65	/ .67
Marbon S	lb.	.55	/ .65
S-1	lb.	.55	/ .65
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	
No. 1-D Heavy Oil	lb.	.04	
Nuba resinous pitch (drums)			
Grades No. 1 and No. 2	lb.	.029	
3-X	lb.	.0425	
Palmalene	lb.	.15	
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	.046	/ .048
Paradene No. 1 (drums)	lb.	.0525	
No. 2	lb.	.0525	
Special (drums)			
20 to 35° C. M.P.	lb.	.0265	
35 to 46° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Paraplex AL-111	lb.	$0.21	/$0.25
G-25, 100%	lb.	.75	
Phthalate	lb.	.51	/ .59
Paroils	lb.	.0975	/ .18
Picco-100	lb.	.09	
Piccocizer "30"	lb.	.055	/ .06
Piccolastic A-5	lb.	.24	/ .245
Piccolyte Resins	lb.	.15	/ .185
Piccoumaron Resins	lb.	.045	/ .15
Piccovol	lb.	.20	/ .25
Pictar	gal.	.18	/ .23
Oil	gal.	.45	
Plasticizer B	lb.	.35	/ .45
35	lb.	.205	/ .24
36	lb.	.305	/ .34
Plastoflex No. 10	lb.	.20	
No. 20	lb.	25	
Plastogen	lb.	.0775	/ .08
Plastone	lb.	.27	/ .30
Poly-pale Resin	lb.	.06	/ .07
R-19 Resin (drums)	lb.	.1075	
21 Resin (drums)	lb.	.1075	
Reogen	lb.	.115	/ .12
Resin R6-3	lb.	.38	/ .40
Ridbo 369	lb.	.08	/ .09
F	lb.	.12	
Rio Resin	lb.	.36	/ .38
RPA No. 1E	lb.	.55	
2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
5	lb.	.57	
Rubberol	lb.	.185	
Santicizer B-16	lb.	.32	/ .36
E-15	lb.	.34	/ .38
M-17	lb.	.355	/ .39
Sebacic Acid	lb.	.48	/ .55
Solvenol	gal.	.56	/ .58
Staybelite	lb.	.06	/ .065
Syntac	lb.	.275	/ .35
TR-11	lb.	.035	
Tarzac	lb.	.23	/ .24
Tricresyl Phosphate	lb.	.24	/ .245
Turgum "S"	lb.	.0675	
Vinsol Resin	lb.	.025	/ .035
Vistac No. 1	lb.	.20	/ .214
No. 2	lb.	.214	/ .227
Witco No. 20, l.c.l.	gal.	.175	
X-1 resinous oil (tank car)	lb.	.011	/ .016
XX-100 Resin	lb.	.0525	

Softeners for Hard Rubber Compounding

Resin C Pitch 45° C. M.P.	lb.	.01	/ .016
60° C. M.P.	lb.	.01	/ .016
75° C. M.P.	lb.	.01	/ .016

Solvents

Carbon Bisulphide	100 lbs.	5.00	/ 5.75†
Tetrachloride	gal.	.73	/ .94†
Cosol No. 1	gal.	.26	/ .34
No. 2	gal.	.25	/ .33
No. 3	gal.	.22	/ .30
GVL	lb.	1.00	
Industrial 90% benzol (tank car)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.	.071	/ .105
Tollac	gal.	.28	/ .33

Stabilizers for Cure

Barium Stearate	lb.	.29	/ .32
Calcium Stearate	lb.	.26	/ .27
Laurex (bags)	lb.	.1475	/ .1725
Magnesium Stearate	lb.	.31	/ .32
Stearex, single pressed	lb.	.15⅜	/ .16⅜
double pressed	lb.	.15⅞	/ .16⅞
Beads	lb.	.14⅞	/ .15⅞
Stearic acid, single pressed	lb.	.15⅜	/ .16⅜
Stearite, c.l.	lb.	.14⅞	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Butaprene NF	lb.	.45	/ .60
NL	lb.	.48	/ .63
NXM	lb.	.50	/ .65
Chemigum N-1	lb.	.53	/ .60
Hycar Latex (dry weight)			
OR-15	lb.	.415	/ .465
OR-25	lb.	.345	/ .395
OS-10	lb.	.345	/ .395
Hycar OR-15	lb.	.43	/ .455
OR-25	lb.	.36	/ .385
OS-10	lb.	.36	/ .385
Neoprene Latex Type (dry weight)			
60	lb.	.28	/ .32
571	lb.	.25	/ .29
Concentrated	lb.	.28	/ .32
572	lb.	.28	/ .32
Neoprene Type CG	lb.	.50	
E	lb.	.65	
FR	lb.	.75	
KNR	lb.	.75	
M	lb.	.65	
Paraplex X-100	lb.	1.00	
Perbunan 18	lb.	.37	
26	lb.	.38	
35	lb.	.43	
Synthetic 100	lb.	.41	

Tackifiers

B.R.H. No. 2	lb.	.015	
Piccolastic A-25	lb.	.24	/ .245
Plastic	lb.	.12	
Synthol	lb.	.225	

Ty-Ply Q	gal.	$6.75	/$8.00
QA	gal.	6.75	/ 8.00
S	gal.	6.75	/ 8.00
SA	gal.	6.75	/ 8.00

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25	
Sulphur	100 lbs.	2.05	
Insoluble, 60	lb.	.16	
Rubbermaker's commercial	100 lbs.	2.05	
Refined	100 lbs.	2.40	
Telloy	lb.	1.75	
Tonox	lb.	.50	/ .59
Vandex	lb.	1.75	
Vultac 1	lb.	.38	/ .45
2	lb.	.38	/ .45
3	lb.	.42	/ .49

Waxes

Carnauba, No. 3 chalky	lb.	.7125	
2 N.C.	lb.	.7675	
3 N.C.	lb.	.735	/ .745
1 Yellow	lb.	.8325	
2	lb.	.8125	
Carnube	lb.	.49	/ .59
Monten	lb.	.12	/ .17
Rubber Wax No. 118			
Colors	gal.	.86	/ 1.41
Neutral	gal.	.76	/ 1.31

RECLAIMED RUBBER

THE overall reclaim situation remained unchanged in the past month. The market is still tight, and the excess demand continues for all types of reclaim. Although the problem of segregation of natural and synthetic rubber scrap remains a sore point, the primary difficulty is the shortage of labor. The inability to obtain labor for a seven-day week on existing reclaiming facilities has been responsible for decreased production, compared with wartime levels, and consequent failure to meet the heavy and increasing demand.

The reclaim market relief expected during the recent steel strike did not materialize as tire manufacturers had sufficient stocks of bead wire on hand to carry them through, and there was therefore no appreciable lessening in demand for tire grades of reclaim.

Most reclaimers have adequate stocks of scrap on hand, as great as a 10-month supply in some cases. When sufficient quantities of new tires become available, probably late this spring, and scrapping of existing rolling tire stocks reaches prewar proportions, scrap rubber stocks will probably attain a two-year supply.

Deliveries of reclaim are running behind schedule, as much as two months in some cases. These delays, coupled with general reclaim market tightness, have compelled some manufacturers of rubber products either to curtail production or shut down temporarily pending receipt of further supplies.

Reclaimed Rubber Prices

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16-1.18	7 / 7¼
Acid	1.18-1.22	8 / 8¼
Shoe		
Standard	1.56-1.60	7½ / 7¾
Tubes		
Black	1.19-1.28	11¾ /12
Gray	1.15-1.26	12½ /13½
Red	1.15-1.32	12½ /13
Miscellaneous		
Mechanical blends	1.25-1.50	5 / 6

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

SCRAP rubber market conditions remained essentially unchanged during February. The principal causes of this inactivity appear to be the desire for lower scrap prices on the part of the reclaimers, the general expectation of increased receipts of natural rubber, and the uncertainty arising from the General Motors strike, all of which contribute to a general reluctance to operate extensively.

All S.A.G. stocks and synthetic tires are moving very slowly. The dullness in No. 1 and even No. 2 peelings seems to be holding over from the previous month. Bids for tire parts have weakened steadily in the past few weeks. Even natural rubber peelings are now being bought at prices $2 a ton cheaper than earlier in the year. Current bids for these peelings from wholesale dealers are $28 a ton delivered to consuming plants, and even No. 3 peelings are down to $26 a ton. Although the call for synthetic rubber scrap is very slight, there are occasional truckloads of No. 3 recap stock at $22-$24 a ton, delivered.

Inner tubes are also backing up, especially in the East. Prices quoted are 5½¢ a pound for mixed tubes, 7¼¢ for red tubes, and 6¼¢ for black passenger tubes. Most of the recent shipments have been to Ohio mills. The movement of straight mixed natural rubber tires to Akron has also slowed down. Purchases are being made at about $19 a ton, also for heavy-duty tires, and at $24.50 for beadless, with some old orders being filled on beadless at $23, delivered. A few mills are taking segregated and plainly identified synthetic rubber tires at a dollar differential.

Some export demand is being noticed and is growing slowly. This trade is being largely ignored as foreign exchange is not backed by dollar credit as yet.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
Red passenger tubes	7½
Black passenger tubes	6¾
Truck tubes	6½

Tires‡	$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Mixed truck tires	20.00
Solid tires	36.00

Peelings†	
No. 1 peelings (natural and synthetic)	52.25
(Recap or retread)	44.41
2 peelings (natural and synthetic)	33.00
(Recap or retread)	28.05
No. 1 light colored (zinc) carcass	57.75

Miscellaneous Items*	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 115 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
* All consuming centers.

Rims Approved and Branded By The Tire & Rim Association, Inc.

Rim Size	Jan., 1946
15" & 16" D. C. Passenger	
16x3.50D	590
16x4.00E	354,633
16x4.25E	49,545
16x4.50E	319,579
15x5.00E	43,134
16x5.00E	6,571
16x5.00F	10,935
15x5.50F	23,365
16x5.50F	11,607
16x6.00F	55
16x4.00E-Hump	132,313
15x4.50E-Hump	33,787
16x5-K	19,578
15x6-L	10,217
16x6-L	14,544
15x6½-L	18,530
17" & Over D. C.	
18x2.15B	4,315
17x3.62	426
18x3.62	1,359
Flat Base Truck	
20x3.75P	4,341
17x4.33R	10,257
20x4.33R	67,683
15x5.00S	1,078
18x5.00S	910
20x5.00S	237,685
24x5.00S	1,017
15x6.00T	1,616
18x6.00T	995
20x6.00T	74,833
20x7.00T	10,046
22x7.00T	1,769
15x7.33V	755
18x7.33V	154
20x7.0	1,239
20x7.33V	43,355
22x7.33V	14,372
24x7.33V	4,132
19x8.37V	748
20x8.37V	301
24x8.37V	531
24x10.00W	1,333
Semi D. C. Truck	
16x4.50E	2,277
16x5.50F	12,463
Tractor & Implement	
12x2.50C	10,005
12x3.00D	2,112
15x3.00D	12,893
16x3.00D	2,837
18x3.00D	1,101
19x3.00D	12,223
21x3.00D	5,177
24x3.00D	1,125
17x3.25E	919
18x3.25E	44
20x4.50E	7,773
18x5.50F	9,727
20x5.50F	5,038
24x5.50R	541
36x6.00S	869
40x6.00S	160
20x8.00T	361
24x8.00T	4,250
28x8.00T	759
32x8.00T	887
36x8.00T	1,927
W8-24	19,004
W8-32	909
W9-24	1,712
W9-36	1,343
W10-24	4,323
W10-28	7,806
W10-36	10,142
W10-38	8,546
W10-40	1,670
W11-26	1,599
DW8-38	404
DW9-36	991
DW9-38	14,248
DW10-26	1,023
DW10-38	17,975
DW11-24	2,026
DW11-28	3,799
DW11-38	4,173
DW12-30	1,872
DW12-34	19
Earth Mover	
24x11.25	34
24x15.00	84
TOTAL	1,733,403

Sierra Rubber Co. is erecting a two-story rubber factory building at 3706 E. 26th St., Los Angeles, Calif. The concrete and steel structure will be 50 by 50 feet and will cost $10,000.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1945		December, 1944	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Balata, crude ....lbs.	11,809	$ 10,136	250	$ 624
Crude rubber ....lbs.	530,986	89,011	138,900	35,427
Latex ....lbs.	28,157	9,480	46,814	13,861
Rubber, powdered, and waste ....lbs.	418,100	16,618	441,200	15,397
Recovered ....lbs.	2,449,000	175,295	2,242,200	164,473
Substitute ....lbs.	284,800	84,868	639,600	250,643
TOTALS	3,722,852	$ 385,408	3,508,964	$ 480,425
PARTLY MANUFACTURED				
Hard rubber in rods or tubes ....lbs.	1,609	$ 1,303	1,763	$ 1,107
Rubber thread, not covered ....lbs.	5,803	5,648	4,303	7,265
TOTALS	7,412	$ 6,951	6,066	$ 8,372
MANUFACTURED				
Belting	....	$ 28,405	....	$ 29,147
Boots and shoes of rubber, n.o.p. ...prs.	5,277	2,858	23,341	16,330
Canvas shoes with rubber soles ......prs.	128	428	14	60
Cement	....	12,217	....	21,372
Clothing of water-proofed cotton or rubber	....	98	....	763
Druggists' sundries	....	26,411	....	29,187
Gaskets and washers	....	20,781	....	11,671
Gloves ....doz. pr.	3,277	9,687	411	2,058
Golf balls ....doz.	1	10	377	287
Heels ....prs.	400	31	672	127
Hose	....	16,118	....	20,302
Hot water bottles	....	1,527	....	1,347
Inner tubes ....no.	109	1,243	17	385
Bicycle ....no.	29	44	....	....
Liquid sealing compound	....	4,159	....	13,394
Mats and matting	....	1,995	....	72
Nursing nipples ....gross	633	2,709	....	....
Packing	....	10,179	....	6,423
Raincoats ....no.	....	....	2,032	16,048
Tire repair material	....	4,721	....	....
Tires, bicycle ....no.	455	562	548	760
Pneumatic ....no.	150	12,363	75	4,368
Solid, for automobiles and motor trucks no.	27	1,503	5	192
Other	....	1,032	....	901
Other	....	144,575	....	123,841
TOTALS	....	$ 303,656	....	$ 299,035
TOTALS, Rubber Imports	....	$ 696,015	....	$ 787,833

Exports of Crude and Manufactured Rubber

	December, 1945		December, 1944	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Crude rubber including synthetic rubber lbs.	1,522,695	$ 279,604	3,849,806	$1,472,351
Waste rubber ....lbs.	898,800	13,045	2,820,800	23,766
TOTALS	2,421,495	$ 292,649	6,670,606	$1,496,117
PARTLY MANUFACTURED				
Soling slabs ....lbs.	1,175	$ 318	1,380	$ 274
MANUFACTURED				
Bathing caps	....	$ 48	....	$........
Belting ....lbs.	273,568	161,933	7,397	4,488
Boots and shoes of of rubber, n.o.p. prs.	179,381	321,184	94,486	178,902
Canvas shoes with rubber soles .....prs.	385,815	363,945	5,032	4,188
Clothing of rubber and waterproofed clothing	....	11,566	....	80,346
Heels ....prs.	264,035	19,826	168,861	19,041
Hose	....	68,264	....	22,153
Inner tubes for motor vehicles.....no.	10,455	34,789	30,467	92,808
Soles ....prs.	....	....	60,897	16,465
Tires, pneumatic, for motor vehicles....prs.	12,303	272,835	39,091	1,143,172
Other ....nos.	119	109	996	22,003
Wire and cable, insulated	....	203,083	....	119,070
Other rubber manufactures	....	45,708	....	56,418
TOTALS	....	$1,503,290	....	$1,759,054
TOTALS, Rubber Exports	....	$1,796,257	....	$3,255,445

"Some Information about Arthur D. Little, Inc." Arthur D. Little, Inc., Cambridge, Mass. 20 pages. This illustrated brochure describes the background and function of the company as a consulting laboratory. A review is given of the work of the laboratory in the fields of chemistry, chemical engineering, applied biology, and mechanical development. There is also a section on the reasons for research, the technique, and the cost.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Replies forwarded without charge*

SITUATIONS OPEN

TIRE AND TUBE DEVELOPMENT AND CONSTRUCTION ENGINEERS—Excellent opportunity in progressive eastern company. Unlimited opportunity for advancement. Salary commensurate with ability. Address Box No. 479, care of INDIA RUBBER WORLD.

WANTED: EXPERIENCED MANAGER FOR RUBBER PLANT making molded products. Location Middle West. Write giving full information as to age, experience, education, companies worked for, positions held, salary expected, references, etc. Enclose photograph. Address Box No. 483, care of INDIA RUBBER WORLD.

WANTED: EXPERIENCED SUPERINTENDENT FOR RUBBER plant making molded products. Location Middle West. Prefer college man with chemical experience. Write stating experience, education, age, companies worked for, positions held, salary expected, references, etc. Enclose photograph. Address Box No. 484, care of INDIA RUBBER WORLD.

TIRE CURING FOREMAN—Must have experience and capability in supervising tire production. Permanent position with attractive salary for man with resourcefulness and ability. Eastern concern. Specify all qualifications first letter. Address Box No. 480, care of INDIA RUBBER WORLD.

CORD SET PRODUCTION MANAGER WANTED. EXCELLENT opportunity for man living in Southern California. Requirements: experience in the manufacture and assembly of cord sets with wire mill or cord set manufacturers. Address Box No. 485, care of INDIA RUBBER WORLD.

CHEMIST WITH EXPERIENCE IN LATEX AND SOLVENT CEMENTS, also other types of adhesives. Plant located in Eastern United States is equipped with modern laboratory. Extra-fine association with university-trained management and staff offers you a most congenial atmosphere. Excellent opportunity for advancement. Write, giving age, education, and experience. Application will be held in strictest confidence. Address Box No. 486, care of INDIA RUBBER WORLD.

TIRE FINISHING SUPERVISOR—Opening for man with experience in supervising duties connected with cured tire final finishing. Position offers excellent opportunity for advancement. All replies confidential. Address Box No. 481, care of INDIA RUBBER WORLD.

SALES STATISTICIAN—YOUNG COLLEGE-TRAINED MAN OR woman to organize and maintain sales statistics department by large, independent Midwestern tire and tube manufacturer. Advise education, business experience, salary record, and family status in first letter. Address Box No. 503, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

RUBBER CHEMIST EXPERIENCED IN COMPOUNDING AND processing of all types of rubber, preferably with knowledge of plastics. Address Box No. 504, care of INDIA RUBBER WORLD.

SALESMAN

with technical experience in rubber compounding wanted to call on rubber manufacturers in the Midwest, by established company manufacturing and selling a wide range of chemicals to the rubber trade. Address Box No. 505, care of INDIA RUBBER WORLD.

TUBE ROOM SUPERINTENDENT OR FOREMAN—Must be capable of supervising all tube room operations. Opening offers unlimited opportunity for man of experience and capability. Progressive eastern concern. All replies strictly confidential. Address Box No. 482, care of INDIA RUBBER WORLD.

CHIEF CHEMIST. PERMANENT POSITION IS OFFERED BY INdependent West Coast rubber manufacturer established for 20 years. Requisites are wide compounding and processing experiences in synthetic and crude rubbers and ability to supervise a staff of assistants in well-equipped Laboratory. Replies solicited only from those able to assume complete responsibility for all technical manufacturing problems. Salary offered is commensurate with responsibilities. Write Box No. 506, care of INDIA RUBBER WORLD, giving age, complete qualifications, and experience.

RUBBER FOOTWEAR FACTORY SUPERINTENDENT TO ASSUME charge of mill, calender, cutting, making and packing departments. Must have background training and experience in the manufacture of waterproof and tennis footwear.

RUBBER FOOTWEAR MAKING ROOM FOREMAN—must have background training and experience in waterproof and tennis footwear manufacture.

MILL AND CALENDER ROOM FOREMAN—must have background training and experience in waterproof and tennis footwear stocks.

METHODS AND TIME STUDY MAN with experience and training in waterproof and tennis footwear production.

Address Reply: ALCAN RUBBER COMPANY, DANIELSON, CONNECTICUT.

(Classified Advertisements Continued on Page 890)

Classified Advertisements

Continued

SITUATIONS WANTED

RUBBER AND THERMOPLASTIC MATERIALS CHEMIST—MARried; 7 years' experience in compounding rubber, synthetic rubber, and thermoplastic materials for wire and cable. Prefer position of Chief Chemist with a small progressive firm. Address Box No. 487, care of INDIA RUBBER WORLD.

RUBBER CHEMIST, M.S., MICHIGAN, DESIRES LABORATORY research, development, control. Experienced on tires, tubes, mechanicals, adhesions, testing, fabrics, batch corrections, latex, compounding, master-batches, formulae, laboratory supervision. Address Box No. 498, care of INDIA RUBBER WORLD.

CHEMIST—CHEMICAL ENGINEER: B.S. IN CH.E., 1940, GRADuate study. Six years' experience natural rubber technology and GR-S manufacture. Experience: control, development, compounding, production, supervision, and pilot plant. Thoroughly familiar with standard rubber-laboratory equipment and testing procedure. Desire responsible position with progressive organization. Address Box No. 500, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

PLANT WANTED FOR MAKING LATEX AND MOLDED RUBBER bathing caps. Large quantities required. Address Box No. 488, care of INDIA RUBBER WORLD.

WANTED: AGENCY FOR RUBBER TILE, MATS, MATTING AND stair treads for Greater New York. Address Box No. 490, care of INDIA RUBBER WORLD.

WORKING PARTNER WANTED FOR PACIFIC COAST RUBBER goods manufacturing plant. Must be thoroughly familiar with latest production methods. $15,000 will purchase half interest. Remarkable opportunity for right party. Address Box No. 491, care of INDIA RUBBER WORLD.

WANTED: FACILITIES AND TIME FOR COMPOUNDING VINYLS, preparing vinyl cements and organisols, embossing press polishing and printing vinyl-free film and coated fabrics. Address Box No. 497, care of INDIA RUBBER WORLD.

FABRIC SCRAP. TIRE MANUFACTURER, NEW YORK METROpolitan Area, wants some one to refine or shred 10,000 pounds fabric scrap per month. Purchase of a machine for this purpose considered. Address Box No. 501, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 892)

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 1—Thropp 15" x 30" Rubber Mill, complete, M.D.; 1—No. 3 Allen Tuber, motor driven, complete; 1—D & B 30" x 30" two-opening Hydraulic Press, steel heated platens, 12" diameter ram; 1—24" x 24" Adamson two-opening Hydraulic Press with 10" ram; 2—24" x 24" Farrel two-opening Hydraulic Presses with 10" ram; 1—24" x 24" Thropp, two-opening, Hydraulic Press with 10" ram; 1—18" x 18" Birmingham, two-opening Hydraulic Press with 6" ram; 1—Holmes Rubber Cutter; 1—French Oil Hydro-pneumatic Accumulator; 1—Worthington Hyd. Pump 1 x 6, 5 GPM, 6,000 pressure, M. D.; 1—W. & P. Mixer; 1—8 x 13" Rubber Mill; 1—Stokes Rotary 32-punch Preform Press; 2—Hydraulic Presses, 20 x 20"; Dry Powder Mixers; Pulverizers; Grinders, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y.

FOR SALE: USED (2) HYDRAULIC PRESSES, 12" RAM, 36" x 36" platens. One has 4 openings; the other 6. Operated with 2,500 lbs.' water pressure, 80 lbs.' steam pressure, 150-ton capacity. Inspection invited. NORTH BERGEN RUBBER MFG. CO. Call UNion 5-5050. Att.: Mr. Sacerdote.

FOR SALE: 24 PR. CURVED FINGER UNGLAZED PORCELAIN glove forms—size 10—length 21 inches. Address Box No. 493, care of INDIA RUBBER WORLD.

1—30 x 30 FARREL MASTICATOR; 1—40" MILL; 1—48" MILL; 1—Experimental 6 x 12" Mill; 4 Spreaders, 6—200-gallon Churns, 2—Pony Mixers, 40-gallon size; 1—Doubling Calender; 1—60" three-roll Calender, 2—Embossing Calenders, 1—Span Grinder; 1—Chambersburg Hydraulic Coining Press; 2—Hydraulic Presses, hot plates; 1—Waldron Spreading Machine. Address Box No. 494, care of INDIA RUBBER WORLD.

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE (Continued)

FOR SALE: PEASE, PEERLESS MODEL, SERIAL 2236R, 220 V., 34 Amp., 33" canvass, continuous blueprint machine, washer and dryer. Completely overhauled—best working condition. Located in Akron, Ohio. $400.00. Address Box No. 492, care of INDIA RUBBER WORLD.

FOR SALE: 2 Adamson 6" Extruders. 400-Ton Hydraulic Extrusion Press. Hydraulic Presses from 12" x 12" to 42" x 48". Platens, from 50 to 500 Tons. Hydraulic Pumps & Accumulators.
WE BUY YOUR SURPLUS MACHINERY.
STEIN EQUIPMENT CO.
426 BROOME ST., NEW YORK 13, N. Y.

FOR SALE: NEW TIRE MOLDS, ONE EACH 475/19, 500/19, 525/18, 550/17, 550/19, 600/16, 625/650/16, 30/5, 32/6 TT, 32/6 HD, 700/20, 750/20, 825/20, 900/20, 975/20. Address Box No. 502, care of INDIA RUBBER WORLD.

FOR SALE: ONE BALDWIN-SOUTHWARK PRESS, 40"x40", 4-Opening Steel Plates, 16" Diameter Ram, 4" Diameter Rod. 1 Baldwin-Southwark Press, 36"x36", 4-Opening Cast Iron Plates, 16" Diameter Ram, 4" Diameter Rods. 2 Adamson Presses, 36"x36", 2-Opening Cast Iron Plates, 14" Ram, 3¼" Diameter Bolts. Address Box No. 507, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES WANTED

WANTED: LARGE QUANTITY LATEX AND RUBBER MOLDED Caps. Address Box No. 489, care of INDIA RUBBER WORLD.

WANTED ONE 6" x 13" or 8" x 16" LABORATORY RUBBER MILL with drive, motor, and controls for 60 cycle, 3 phase, 220 V. current. Also one one-gallon-size internal kneading machine equipped with heating and cooling jackets and powered by 1 H.P. or greater explosion-proof driving motor. Please state price, location, and complete description. Address Box No. 495, care of INDIA RUBBER WORLD.

WANTED: NEW OR USED TIRE SPLITTER. ADDRESS REPLIES to Mr. H. A. Berg, Flintkote Co., Morristown, N. J.

ONE NO. 3 ROYLE TUBING MACHINE IN GOOD OPERATING condition, with or without gear reduction drive and motor. ASSOCIATED RUBBER, Quakertown, Pa.

WANTED: CAMERON OR EQUIVALENT SLITTERS, LABORATORY calender, production mills, polishing and embossing presses, embossing calenders, vinyl film printing equipment, knife and roller coaters. Address Box No. 496, care of INDIA RUBBER WORLD.

WANTED: LATHE-CUTTING EQUIPMENT. BLACK ROCK MODel 4A-4C, 4H or equivalent: Also Black Rock or Morris Trimmers with circular attachment. Address Box No. 499, care of INDIA RUBBER WORLD.

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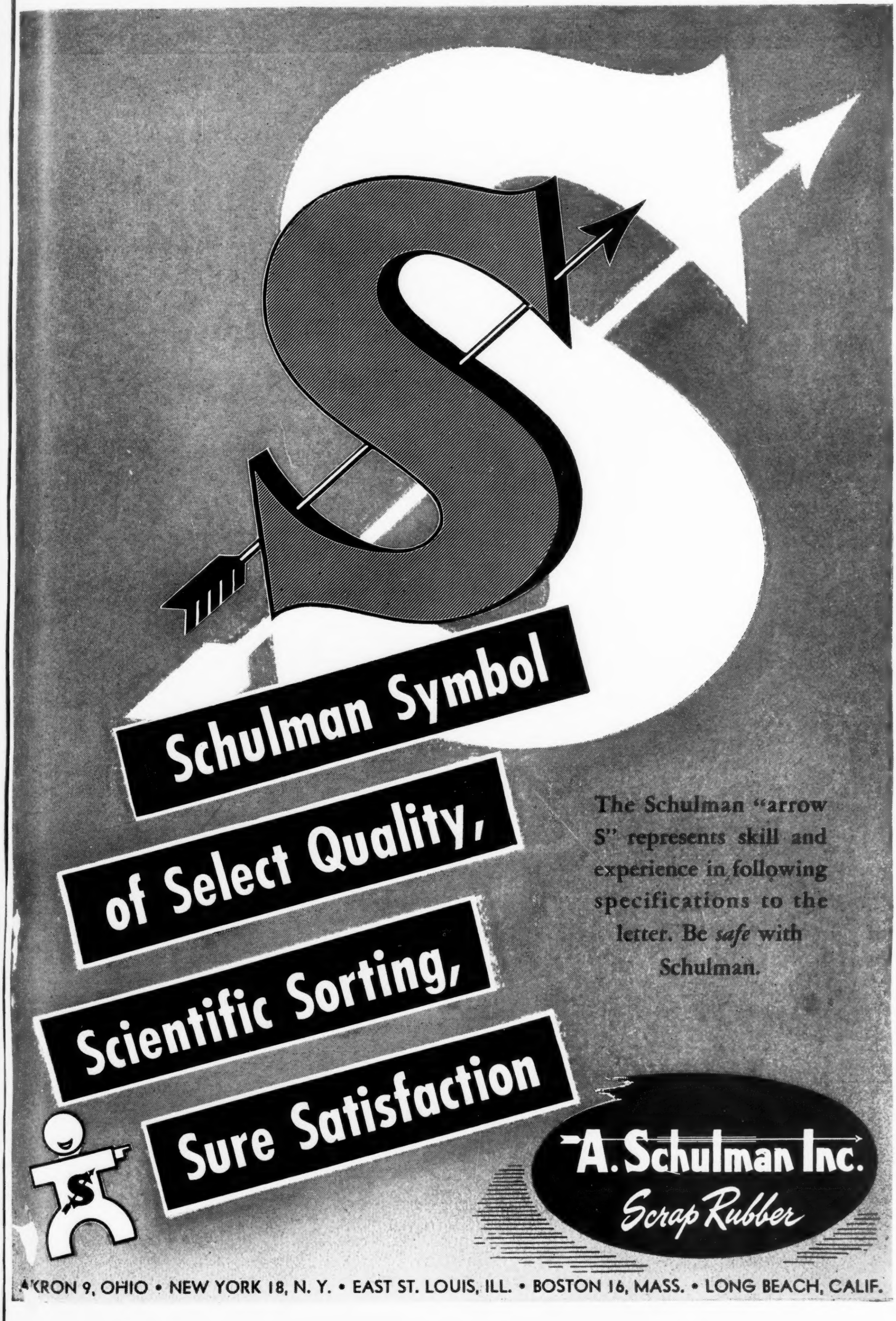
Schulman Symbol
of Select Quality,
Scientific Sorting,
Sure Satisfaction
The Schulman "arrow S" represents skill and experience in following specifications to the letter. Be *safe* with Schulman.
A. Schulman Inc.
Scrap Rubber
AKRON 9, OHIO • NEW YORK 18, N. Y. • EAST ST. LOUIS, ILL. • BOSTON 16, MASS. • LONG BEACH, CALIF.

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